EN

USE AND INSTALLATION MANUAL

TECNIKA 28-35

COD.8901113900

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General information

The user is NOT permitted to service this boiler.

The manufacturer cannot be held liable for personal injury, harm to animals or property damage resulting from failure to observe the instructions contained in the manuals supplied with the boiler.

1. GENERAL INFORMATION

1.1. Symbols used in this manual

When reading this manual, pay particular attention to the parts marked with symbols. These symbols are used to give the following warnings:

DANGER!
Serious risk to safety and to life

CAUTION!
Potentially hazardous situation for the product and the environment

NOTE!
Recommendations for users

1.2. Proper appliance use

The instruction manual is an integral and essential part of the product and must be kept by the user or system manager.

Read the warnings contained in the manual carefully, since they provide important information about safe installation, use and maintenance.

Keep the manual in a safe place for future reference.

Installation and maintenance must be performed in compliance with the applicable regulations according to the manufacturer's instructions and by qualified personnel trained pursuant to the law.

Incorrect installation or improper maintenance could cause personal injuries, harm to animals or property damage, for which the manufacturer will not be held liable.

Before carrying out any cleaning or maintenance operations, disconnect the appliance from the mains power supply using the system switch and/or the relevant cut-off components and close all cocks.

If the appliance has a fault and/or is not operating correctly, switch the appliance off and do not make any attempt to repair it or service it directly. Contact authorised personnel only. Any repairs to products must be carried out using only original spare parts. Failure to observe the above recommendations may compromise the safety of the appliance.

If the appliance is sold or transferred to a new owner or the owner moves, leaving the appliance in situ, always ensure that the manual is kept with the appliance so that it can be consulted by the new owner and/or installer.

For all appliances with optional equipmement or kits (including electrical kits) use only original accessories.

This appliance must be used only for the use expressly intended. Any other use is to be considered incorrect and therefore dangerous.

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The TECNIKA appliance has been built according to the latest technologies and in accordance with the applicable technical safety regulations.

Nonetheless, the incorrect use of the appliance may result in hazards and also endanger the user or others, or even damage the appliance or other objects.

The appliance is intended for the operation of hot water heating systems.

Appliance use in accordance with the envisaged purposes includes scrupulous observance of the instructions provided in this manual.

RED reserves the right to make any changes to the design and factory settings of the burner and hot water boiler without having to inform the end users of such changes.

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2. GUARANTEE TERMS

The Manufacturer guarantees the product, with the exception of parts subject to normal wear specified below, for two years from the date of purchase, provided that proof of purchase is supplied in a document specifying the name of the retailer and the date the sale was made and that the completed guarantee certificate was sent within 8 days of said purchase. The product must also be installed and tested by a specialised installer and in accordance with the detailed instructions provided in the instruction manual that accompanies the product.

The guarantee covers the replacement or free repair of parts recognised as being faulty at source due to manufacturing defects.

2.1. Warnings

- Installation, electrical connection, functional check and maintenance of this appliance must only be performed by qualified or authorised personnel.
- This appliance must not be used by anyone (including children) with reduced physical, sensory or mental skills and with little experience and knowledge, unless they are supervised or have been instructed to use the appliance by the person in charge of its safety.

The guarantee applies, provided that:

1. The boiler is installed, in accordance with the applicable standards in force and the instructions provided in the product use, maintenance and installation manual, by legally qualified personnel (Italian Ministerial Decree no. 37 of 22nd January 2008);
2. The customer holds the documentation certifying its suitability in all parts:
    a. INSTALLATION REPORT - filled in by the installer
    b. TEST REPORT and GUARANTEE APPLICATION - filled in by an authorised serviceman
    c. The guarantee applies from the date of first start-up of the boiler, which must be indicated on the boiler manual or from the invoice date. This documentation must be presented to the authorised service centre in the event of servicing.

2.2. Exclusions

The guarantee does not cover any parts found to be faulty due to negligence or inappropriate use, incorrect maintenance, or installation not performed in compliance with the manufacturer's instructions. The manufacturer will not be held liable for any damage which may - either directly or indirectly - be caused to persons, animals or property resulting from failure to observe all the instructions provided in this manual and, specifically, concerning the warnings regarding installation, use and maintenance of the appliance.

The guarantee is not valid if:

1. The terms for the guarantee application were not observed.
2. Installation was not performed in observance of the applicable standards in force and the instructions provided in the use, maintenance and installation manual.

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The guarantee does not cover:

1. Damage made by atmospheric agents, chemicals, electrochemical elements, incorrect product use, natural disasters, electrical discharges, fires, faults in the electrical system, modifications to or tampering with the product, and/or other causes not ensuing from the product manufacturing
2. Damage caused by normal corrosion
3. Damage relating to the combustion chamber
4. Damage to seals, claddings, painted/chromed parts, handles and electrical wires
5. Damage to masonry work
6. Damage to parts of the system for the production of DHW not supplied by RED
7. Damage to the heat exchanger if a suitable condensation-proof circuit is not set up to guarantee a minimum boiler return temperature of at least 55 °C.
8. Servicing for calibration or product adjustments
9. Incorrect or negligent use.
10. All damage caused by transport; we consequently advise you to check the goods carefully upon receipt, notifying your retailer immediately of any damage, making a note on the delivery note and on the copy that travels with the carrier.

Please contact your retailer and/ or local importer in the event of product failure.

RED will not be held liable for any damage which may - either directly or indirectly - be caused to property, or personal injury or harm to animals ensuing from failure to observe all the instructions provided herein and the applicable regulations regarding installation, use and maintenance of the appliance.

The parts replaced will be guaranteed for the remaining guarantee cover period starting from the original date of purchase of the product.

2.3. Additional clauses

If faulty or malfunctioning parts are detected during normal product use, these will be replaced free of charge ex retailer who made the sale or ex our local technical service centre.

For products sold abroad, the same circumstances will again result in free replacement, ex our retailer, with the exception of specific conditions agreed upon at the time of negotiations with the foreign distributor.

In the case of replaced parts, the guarantee will not be extended.

No damages are awarded for the product downtime period.

This is the only applicable guarantee and no-one is authorised to provide any other guarantees in the name of or on behalf of RED.

2.4. Liability

RED will not pay any compensation for direct or indirect damage caused by or dependent upon the product.

2.5. Court with jurisdiction

In the event of any controversy, the court with jurisdiction is the Court of Pordenone (Italy).

2.6. Liability exclusion

The manufacturer is not able to supervise the observance of the instructions provided in this manual. Nor is it able to monitor the conditions and methods of installation, operation, use and maintenance of the product. Incorrect installation could cause damage and endanger persons. Consequently, we cannot be held in any

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way liable for losses, damage or costs ensuing from incorrect installation, improper functioning and incorrect use and maintenance or in any way connected to the latter. Similarly, we will not be held in any way liable for any violations of patents or third party rights ascribable to the use of this product.

The manufacturer reserves the right to make any changes to the product, technical specifications or to the manual without notice.

If hazard-free operation is no longer possible (for instance, due to visible damage), turn off the appliance immediately.

2.7. Service call

Service calls must be made to the retailer, who will forward the call to the technical support department.

The manufacturer cannot be held liable if the product and any of its accessories are used incorrectly or modified without authorisation.

Only original spare parts must be used for replacements.

2.8. Installation standards

Tecnika 28-35 is wood-fired boiler.

It must be installed according to the provisions of the following standards:

Italian Law Decree no. 93 of 25th February 2000

Implementation of Directive 97/23/EC (P.E.D.) on the subject of pressure equipment.

SCOPE OF APPLICATION: liquid fuel (naphtha, gas oil, fuel oil) and solid fuel operated appliances.

ITALIAN LAW no. 46 of 5th March 1990 and related applicative regulations Italian Ministerial Decree no. 447 of 6th December 1991 (and subsequent amendments)

System safety standards

SCOPE OF APPLICATION: without limits to heat potential.

Standard UNI 10847 of 03/2000

Single flue systems for liquid and solid fuel generators. Maintenance and control. Guidelines and procedures.

SCOPE OF APPLICATION: liquid and solid fuel operated systems.

ITALIAN LAW of 9th January 1991 No. 10 and related applicative regulations Italian Ministerial Decree no. 412 of 26th August 1993 (and subsequent amendments), Italian Ministerial Decree no. 551 of 21st December 1999.

Regulations specifying amendments to Italian Presidential Decree 412 on the subject of planning, installing, running and servicing heating systems in buildings for the purposes of limiting energy consumption.

SCOPE OF APPLICATION: without limits to heat potential.

ITALIAN LAW NO. 186 of 01.03.1968

Installation standard CEI 64-8 / II ed.

Electrical utility systems at a nominal voltage of no more than 1000 V in alternating current and 1500 V in direct current.

Installation standard CEI 64-8 / I ed.

Electrical utility systems in buildings intended for residential and similar purposes.

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3. TECHNICAL SPECIFICATIONS AND DIMENSIONS

3.1. General information on hot water boilers

"TECNIKA" hot water wood gasification boilers are have a steel structure and use solid biomass, in the form of wood logs, as fuel. The boiler is designed for connection to hot water heating systems.

Tecnika boilers comply with P.E.D. 97/23/EC.

TECNIKA series hot water wood gasification boilers consist of the following components:

- "TECNIKA" hot water boiler - 1 (one)
- ceramic ducting element in combustion chamber - 1 (one)
- thermal valve for controlling air flow rate - 1 (one)
- steel brush for cleaning ashes - 1 (one)
- ash scraper – 1 (one)
- "TECNIKA" series hot water boiler use and instruction manual - 1 (one).

3.2. TECNIKA 28-35 boiler description

The "TECNIKA" hot water boiler heat exchanger complies with the operating requirements of this type of appliance, as set out in the operation standard: *EN 303-5/2000.*

The hot water boiler consists of the following components/modules:

- **heat exchanger,** consisting of a welded steel plate structure. The upper part of the boiler accommodates the fuel hopper which is manually filled with wood logs. The fuel chamber is the ideal environment for the fuel pyrolysis process and volatile gases are conveyed towards the lower section of the boiler, where they are oxidised in the combustion chamber. The combustion chamber contains a ceramic coating, a nozzle and a combustion gas ducting element to ensure combustion process efficiency;
- **combustion nozzle**, made of ceramic material, positioned in the lower section of the fuel hopper to ensure optimal conditions for combustion process efficiency;
- **ceramic ducting element**, positioned in the boiler combustion chamber allows high temperature levels and guarantees optimal fuel oxidation;
- **combustion gas fan** fitted on the back of the boiler conveys combustion gases outside the boiler and controls its operation;
- **air distribution box**, provided with primary air control valve. This box doubles as heat exchanger and pre-heats the ambient air before it is used in the combustion chamber of the boiler. The inlet of this box is provided with an inlet control fin actuated by a thermostat valve and controls the air taking into the boiler;

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- **hydraulic connections,** have female threading (see table for dimensions) and are positioned in the lower rear left part of the heat exchanger along the return line and in the upper rear left part of the boiler along the flow line;
- **exhaust connection** has female threading (see table for dimensions) and must be connected to the exhaust valve;
- **emergency cooling coil** is used for emergency cooling of the water circulating the heat exchanger of the boiler when the water is very hot. The coil has a G½" male union threading;
- **combustion gas outlet duct** (external diameter shown in Table 2.2) is located in the upper rear part of the boiler;
- the heat exchanger is thermally insulated with **mineral wool** to minimise thermal dispersion;
- **doors** of the fuel hopper and the combustion chamber are made of cast iron to ensure high thermal resistance and sealing of the boiler;
- **external casing** of the boiler is made with sheet steel.

3.3. Technical data

Thermal and technical data of "TECNIKA" hot water wood gasification boilers:

PARAMETERS	UNIT OF MEASURE	VALUES	
MODEL		28	35
HEAT OUTPUT AT COMBUSTION CHAMBER	kW	28	35
NOMINAL HEAT OUTPUT	kW	25	30
OPERATING RANGE (min-max)	kW	13-25	15-30
SOLID FUEL USED	Wood logs for heating, max. water content 20%		
WOOD LOG CONSUMPTION RATE (min-max)	kg/h	3,7-6,9	5,1-9,7
FRESH AIR RATE REQUIRED FOR EFFICIENT COMBUSTION PROCESS AND BOILER OPERATION	kg/h	80-95	110-130
	m^3/h	55-70	100-110
MASS OF SMOKE	g/s	28,1	36,1
AVERAGE WOOD LOG CONSUMPTION RATE (the boiler operates in a normal heating system)	kg/h	4.7	6.7
HEATING EFFICIENCY (min-max)	%	85	
TEMPERATURE OF COMBUSTION GASES AT NOMINAL HEAT OUTPUT	°C	180-230	
SOLID FUEL RESIDUE	ASH	The quantity depends on the ash contents of the raw fuel, as well as on the operating conditions	

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Dimensions and technical data of "TECNIKA" hot water wood gasification boilers:

PARAMETERS		UNIT OF MEASURE	VALUES	
MODEL			28	35
WEIGHT		kg	290	370
WATER SLEEVE CAPACITY		dm^3	70	90
FUEL CHAMBER CAPACITY		dm^3	100	130
		kg	16-20	20-24
NOMINAL HEAT OUTPUT TIME INTERVAL AFTER LOADING FUEL CHAMBER		Hours	2-3	2-3
MAXIMUM WOOD LOG LENGTH		mm	330	500
DIMENSIONS	L=WIDTH	mm	780	
	P=DEPTH		975	1123
	A=HEIGHT		1282	
OPERATING PRESSURE OF CIRCULATING WATER		bar	2	
HYDRAULIC PRESSURE LOSS AT NOMINAL HEAT OUTPUT		Pa	20	21
TYPE OF EXPANSION VESSEL FOR THE HEATING SYSTEM		-	Open or closed	
PRESSURE TESTED IN THE FACTORY		bar	4	
RECOMMENDED TEMPERATURE FOR THE WATER CIRCULATING IN THE BOILER		°C	80-85	
RECOMMENDED TEMPERATURE FOR RETURN WATER IN THE BOILER		°C	60	
DRAUGHT		hPa	0.18-0.24	
CONNECTIONS	FLOW/RETURN	G	1 ½"	
	EXHAUST	G	¾"	
	EMERGENCY COOLING COIL	G	½"	
	COMBUSTION GAS DUCT	mm	150	
POWER SUPPLY		-	230 V; 50 Hz	
POWER SUPPLY CABLE		-	3 x 1.5 mm^2	
ELECTRICAL CAPACITY		VA	37	65
ELECTRICAL PROTECTION		-	IP20	
BOILER CLASS (ACCORDING TO EN 303-5)		-	3	

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3.4. Boiler fuel supply

The boiler must be supplied with the following fuel:

wood logs, preferably cut, with the following features:

- pure wood, use of contaminated wood is not allowed (i.e. painted wood, subjected to chemical treatment or other mineral or organic substances)
- the length of the wood logs must correspond to the depth of the combustion chamber of the boiler *(see boiler technical specifications)*
- the crosswise section (diameter) of the wood logs must be: D ≤ 200 mm
- the raw material humidity content must be less than 20% ($W^r \leq 20\%$)
- wood-based fuel such as sawdust, wood chips and other small combustible particles may be used in addition to wood logs, but their total amount must be less than 20% of the fuel loaded into the boiler chamber.

Approximate recommended fuel parameters - cut, pre-dried wood logs

PARAMETERS	UNIT OF MEASURE	VALUES
TYPE OF FUEL	WOOD LOGS	
WOOD LOG LENGTH	mm	See previous table
HUMIDITY CONTENT	%	≤20%
CALORIFIC POWER OF FUEL USED IN OUR CALCULATIONS	MJ/kg	>13.9
	kWh/kg	>3.9

EXPLANATION: the maximum percentage of humidity in wood must be 20%. It is advisable to use wood dried for at least 1 year.

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3.5. Main components

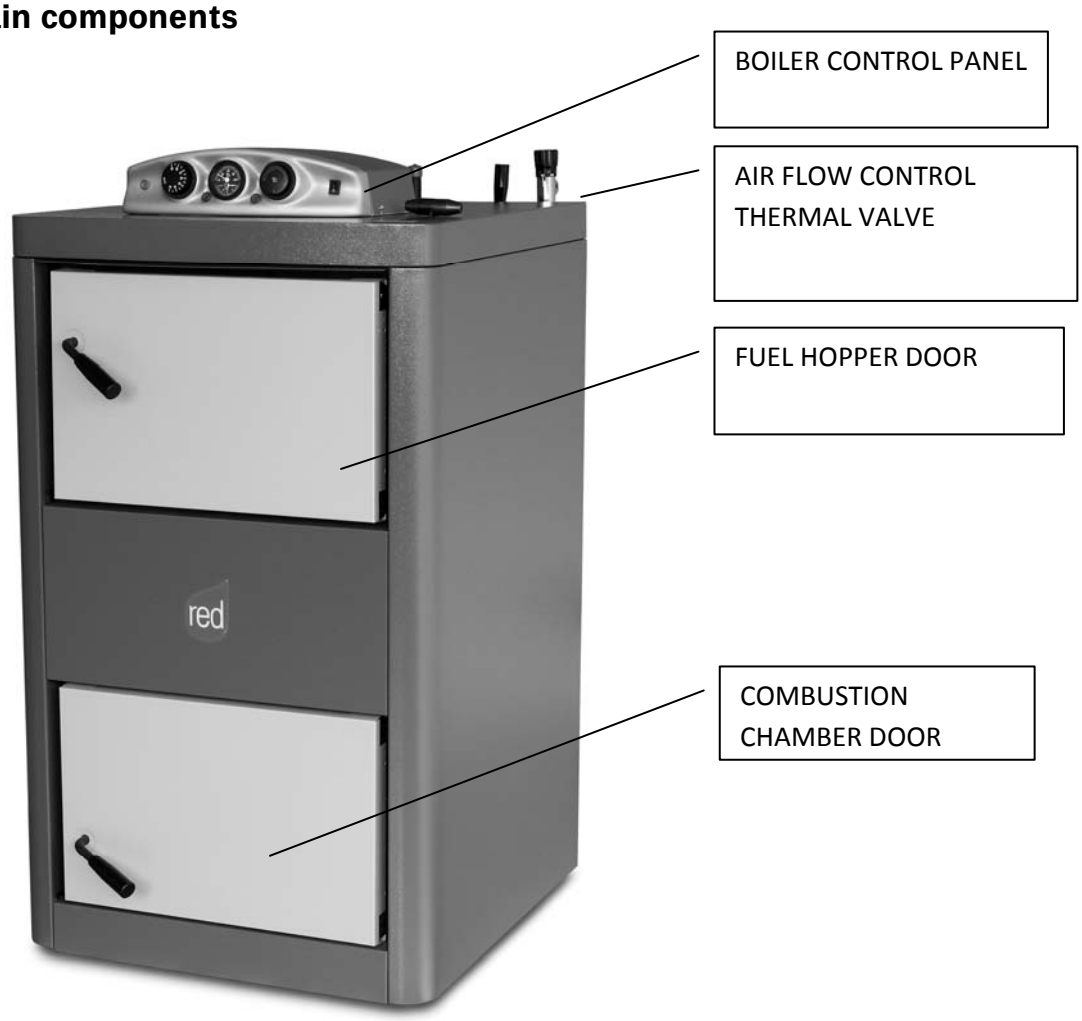

Fig. 3.5.1 View of the "TECNIKA" hot water wood gasification boiler - Description of main components of the boiler

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EXPLANATION: the values of the dimensions indicated by letters: **L, A** and **P** are shown in Table page 12.

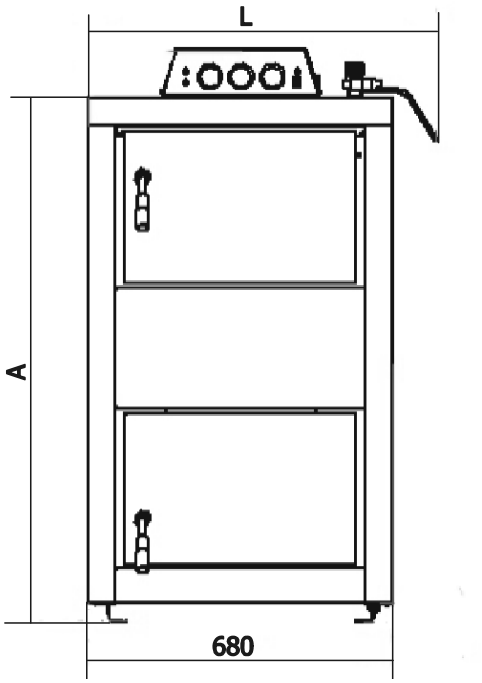

Fig.3.5.2 Front view of the "TECNIKA" hot water wood gasification boiler

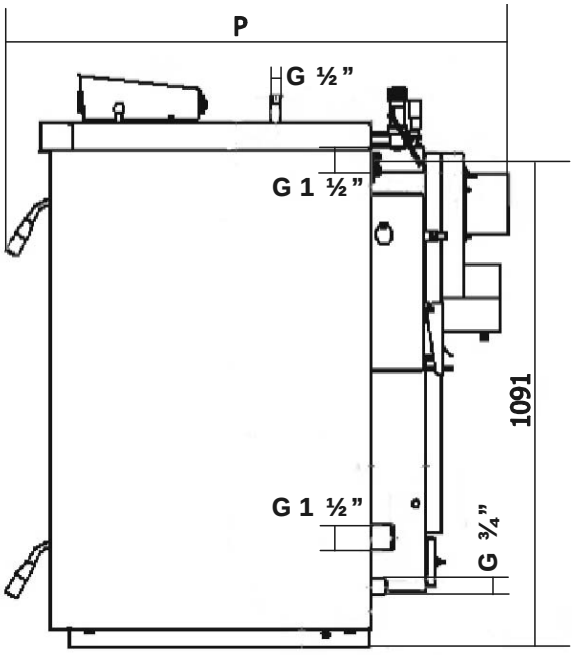

Fig.3.5.3 Side view of the "TECNIKA" hot water wood gasification boiler

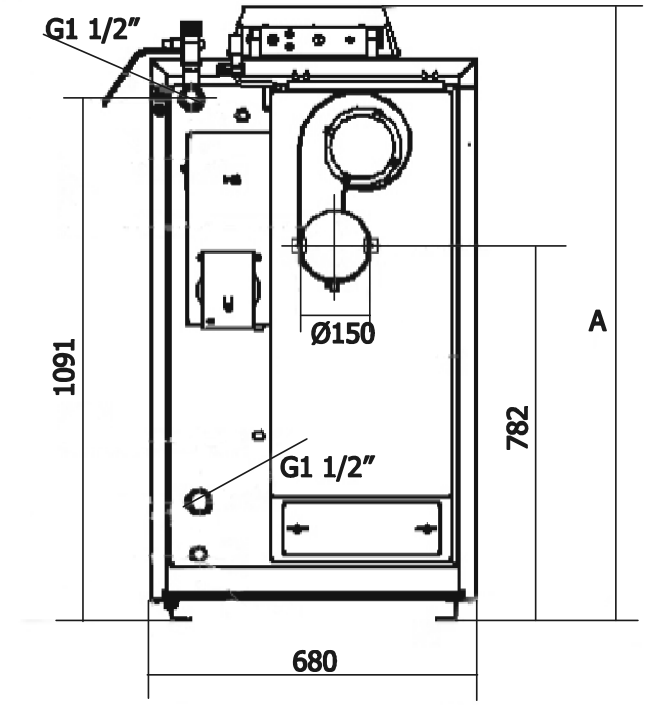

Fig.3.5.4 Rear view of the "TECNIKA" hot water wood gasification boiler

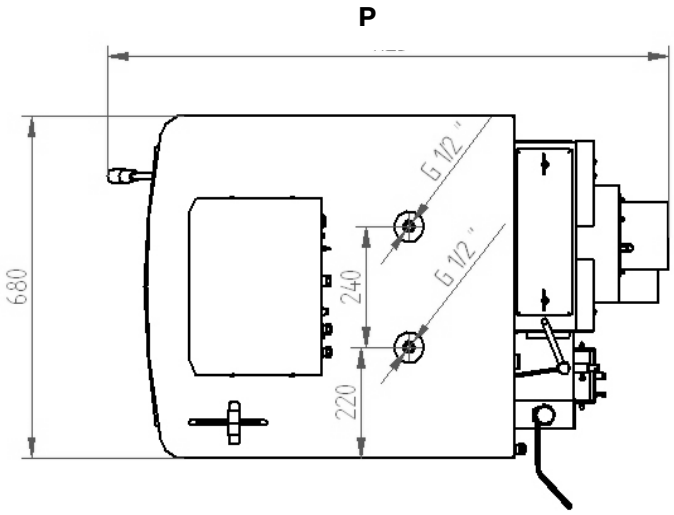

Fig.3.5.5 Top view of the "TECNIKA" hot water wood gasification boiler

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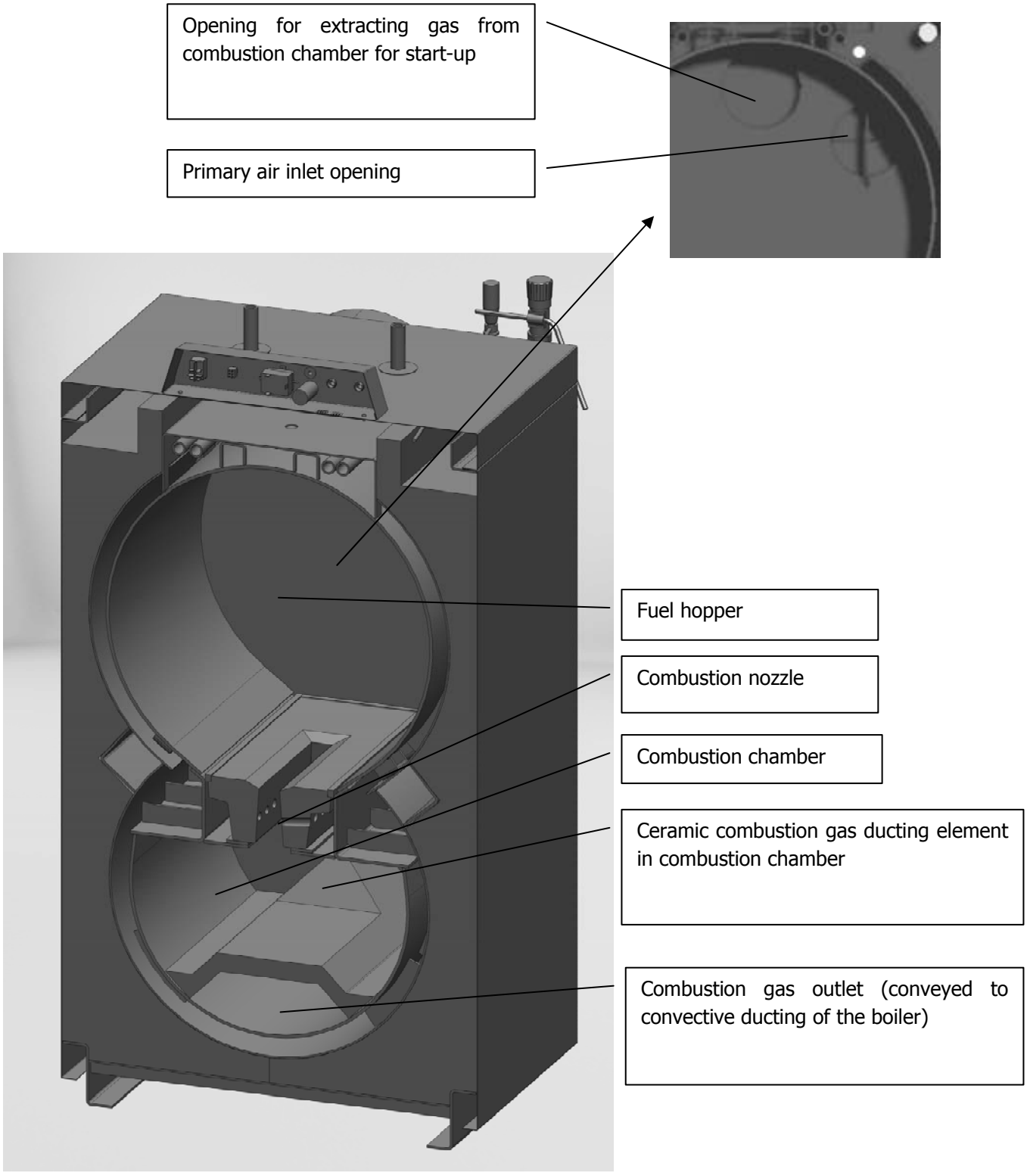
Opening for extracting gas from combustion chamber for start-up
Primary air inlet opening
Fuel hopper
Combustion nozzle
Combustion chamber
Ceramic combustion gas ducting element in combustion chamber
Combustion gas outlet (conveyed to convective ducting of the boiler)

Fig.3.5.6 Section view of the "TECNIKA" hot water wood gasification boiler

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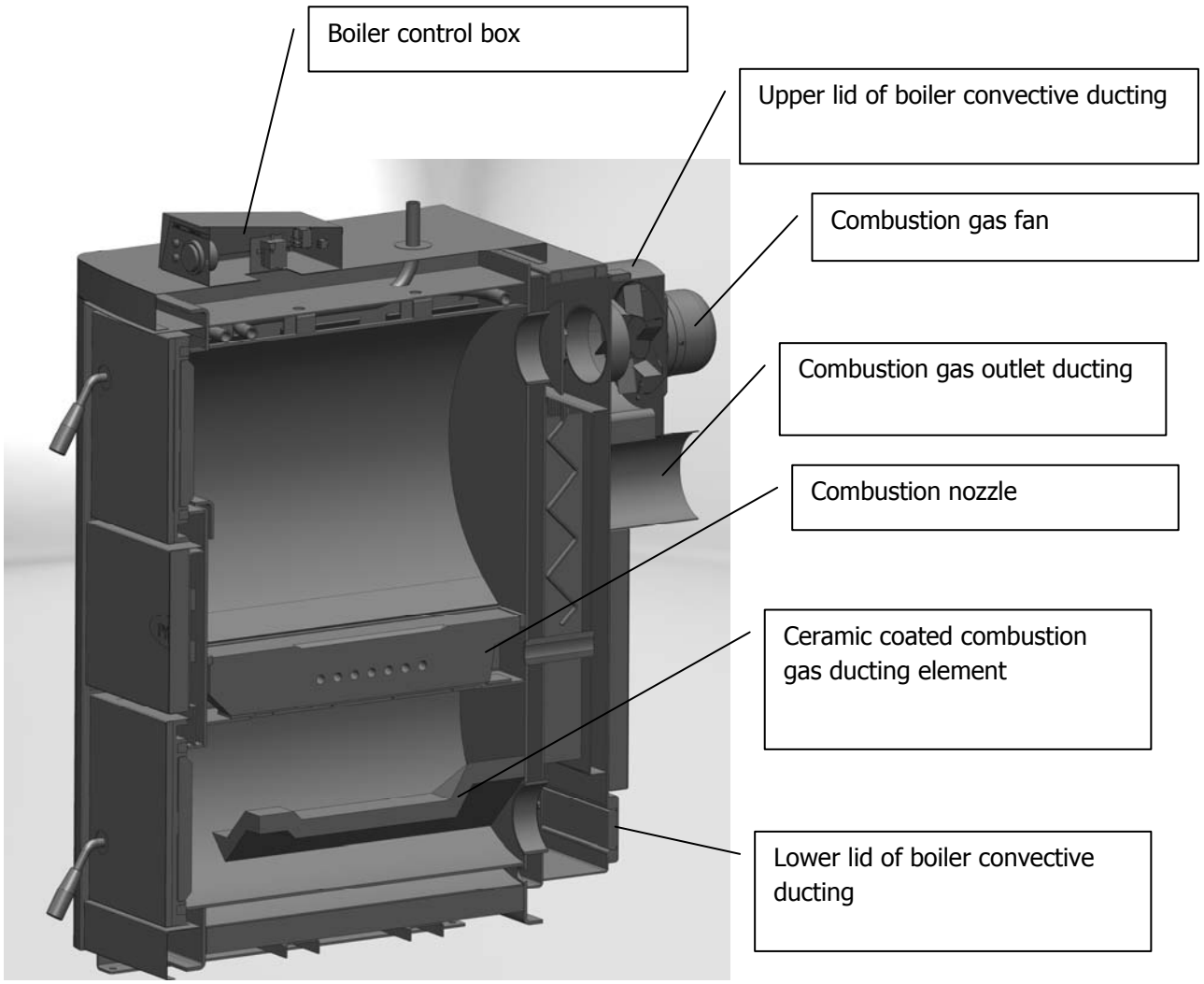
Boiler control box
Upper lid of boiler convective ducting
Combustion gas fan
Combustion gas outlet ducting
Combustion nozzle
Ceramic coated combustion gas ducting element
Lower lid of boiler convective ducting

Fig.3.5.7 Longitudinal view of the "TECNIKA" hot water wood gasification boiler

The manufacturer reserves the right to make any changes to design and construction of the boiler without having to inform end users of such changes.

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4. Installing a "TECNIKA" hot water boiler

CAUTION: be careful not to damage or crack the ceramic element fitted inside the combustion chamber of the boiler when transporting the boiler (secure the element appropriately or transport it separately from the boiler):

- installing the hot water boiler in rooms not fit for occupancy, including corridors, is not allowed
- the "TECNIKA" wood gasification boiler may be connected to a heating system equipped with **open** or **closed** expansion vessel designed according to the water capacity of the entire heating system
- both the heating system and the hot water boiler must be filled with circulating fluid (water) and air must be bled from the system before starting up the boiler.

4.1. Packaging

The boiler is delivered complete with assembled electrical and mechanical parts after having been tested at the factory.

The boiler is delivered on one pallet. The boiler must always be handled vertically, using manual or mechanical cranes, which can lift the pallet on which it is packaged or the boiler itself directly.

Take special care not to damage electrical or mechanical parts, with shocks or water sprays once the protective packaging has been removed.

- After removing the packaging, make sure the boiler is complete and undamaged
- If in doubt, contact the retailer
- The document envelope contains:
  - System manual
  - An instruction manual for installation, use and maintenance
  - Appendix G - Technical inspection report for heating system with an output of less than 35 kW
  - Guarantee

4.2. Boiler room

Make sure the room complies with the requirements and characteristics set out in the applicable regulations in force. It is also necessary for the room to provide at least as much air as is required for regular combustion. It is therefore necessary to make holes in the walls of the room, which comply with the following requirements:

- Have a free cross-section of at least 6 cm^2 for every 1 kW (859.64 kcal/h). Nevertheless, the minimum cross-section of the opening must never be less than 100 $cm^{2.}$ The cross-section can also be calculated using the following ratios:

  $S = K * Q \geq 100\ cm^2$

  Where "S" is expressed in cm^2, "Q" in kW, "K" = 6 cm^2/kW
- The opening must be situated at the bottom of an external wall, preferably opposite the one where the combustion gases are vented.

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4.3. Connection to the flue pipe

For the connection of the flue outlet pipe, local and national regulations must be observed (see Standards UNI 7129 and UNI 10683).

A flue pipe must comply with the following requirements:

- It must be made of waterproof material resistant to the temperature of the smoke and related condensation.
- It must ensure sufficient mechanical resistance and weak heat conductivity.
- It must be perfectly sealed, to avoid the cooling of the flue pipe itself.
- It must be arranged as vertically as possible.
- Chimneys both old and new, built without observing the above specifications, may be conveniently recovered by "intubating" the chimney itself. This means a metal flue shall be inserted inside the existing chimney and the space between the metal flue and the chimney shall be filled with suitable insulation.
- In order to prevent the wind from creating pressure areas around the chimney that prevail over the rising force of the combustion gases, the outlet aperture must be positioned at least 0.4 metres above any structure adjacent to the chimney itself (including the ridge of the roof) at least 8 metres away.
- **The flue pipe must have a diameter of no less than the boiler union;** for flue pipes with a square or rectangular cross-section, the internal cross-section must be increased by 10% compared to the boiler union.
- We recommend calculating the flue cross-section from the following report to guarantee adequate draught:

  S = K x P/√H

  S ensuing section in cm^2

  K reduction coefficient: 0.04 for wood and pellet

  P boiler output in kcal/h

  H height of the chimney in metres, measured from the flame axis to the outlet of the chimney into the atmosphere. When sizing the flue pipe, please take into account the actual height of the chimney in metres, measured from the flame axis t the top, decreased by:
- 0.50 m for every change in direction of the union duct between the boiler and the flue pipe
- 1.00 m for every metre of horizontal development of the union itself.

- **We recommend the sole use of outlet ducts which are suitable for the type of fuel used. The supplier will not be held in any contractual and non-contractual way liable for damage caused by installation and usage errors and in any case due to failure to observe the instructions provided by the manufacturer of the appliance.**
- **The products of combustion of the boiler cannot be discharged in collective flue ducts.**
- **The correct installation of the flue duct is necessary to encourage the normal flow of smoke from the combustion chamber to the outside in the event of an electrical power failure.**
- **Remember that a draught of 20 Pa must be guaranteed.**

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Below are the main characteristic traits of the flue duct according to the provisions of standards UNI 7129 and UNI 10683:

- The smoke outlet must be equipped with inspection valves;
- The minimum height of the pipe directly connected to the smoke outlet of the boiler must be between 2-3 m;
- If the presence of a horizontal section is necessary, we recommend that the same is of a maximum length of 1.5 m and with a slope gradient of 3-5% to encourage the smoke to flow away;
- **Use of a wind-proof and rain-proof terminal** to avoid changing the slight overpressure inside the flue pipe (we recommend you end the flue pipe with a horizontal section);
- The outlet ducting must be made with suitable materials which can withstand the products of combustion and any condensation of the same (the inspection valve can allow any condensation that has formed to be vented);
- The ducts must be built to ensure maximum seal against smoke (UNI 10683);
- We recommend you insulate the duct, especially on the outside part exposed to the weather.

Avoid installing completely horizontal sections.

The room where the heat generator is to be installed must not contain any existing or envisaged smoke suction hoods in order to avoid depressurising the setting.

The air intakes must not be closed.

Make sure the flue pipe is kept clean, cleaning it at least once a year.

In the event of a fire in the flue pipe or duct, switch the boiler off immediately and disconnect it from the domestic electricity mains

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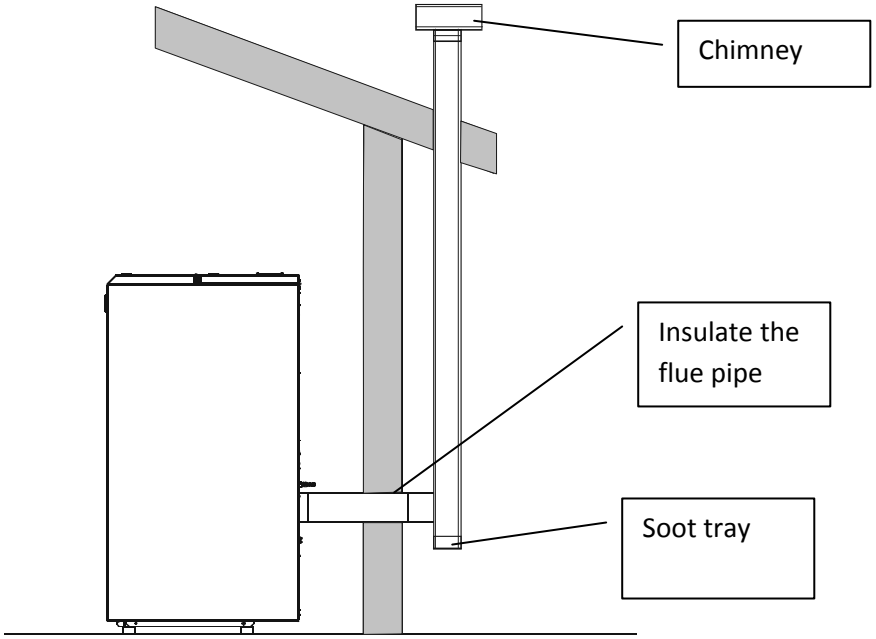
4.3.1 Roof outlet along an external steel flue pipe

One of the installation solutions which could be used is to position the boiler near a perimeter wall of the home (see figure below) so that the smoke is discharged along an external flue pipe. Here are some of the provisions of standard UNI 7129 for this particular system configuration:

- Always make sure there is an inspection valve to allow periodic and efficient cleaning, as well as the venting of any condensation that may have formed;
- The chimney must under all circumstances be wind-proof and rain-proof;
- Make sure the smoke outlet duct is suitably insulated in the section that crosses the wall.



It is advisable for the smoke outlet duct, if it is completely outside, to be made of double-wall stainless steel to guarantee both greater resistance to the atmospheric agents as well as the appropriate temperature of the smoke outlet.

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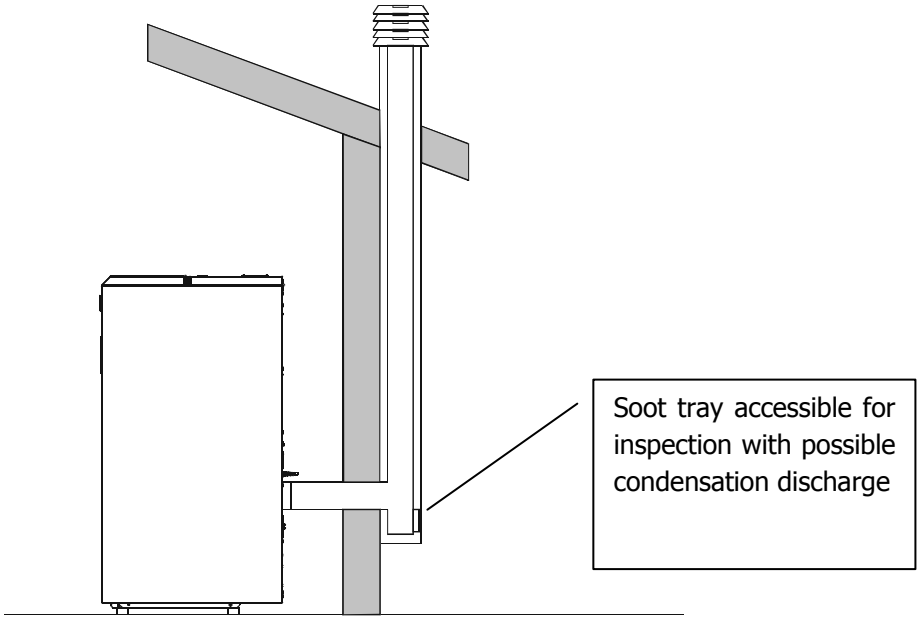
5.3.1 Roof outlet along a traditional flue pipe

The flue smoke can also be discharged using an existing traditional flue pipe provided it is compliant to standards (see UNI 10683).

Here is a brief list of the main characteristics highlighted in the standard that distinguish a good chimney:

- Suitable insulation and lagging especially in the external section exposed to the atmosphere;
- Constant internal cross-section (there must not be any narrower sections);
- Made with material resistant to high temperatures, to the action of the products of combustion and to the corrosive action of any condensation that may form;
- Prevalently vertical arrangement with deviations from the axis of no more than 45°;



It is compulsory to plan a chamber for the collection of solid material and/or any condensation, which can be inspected through an airtight door.

It is compulsory for you to observe the provisions of standards UNI 9615 and 9731 for the sizing of the chimney cross-section and in any case that you avoid installing ducts with a cross-section of less than 150 mm.

In the case of larger cross-sections, it may be necessary to insert a steel duct inside the masonry one.

Direct wall discharge is not permitted.

The steel pipe must be suitably insulated with material which is resistant to high temperatures and sealed off from the external chimney.

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4.4. System connection

It is advisable for the connections to be easy to disconnect by means of swivel pipe unions. It is always advisable to fit suitable cut-off gate valves on the heating system piping.

Caution: a safety valve must under all circumstances be fitted on the system.

To prevent hazardous corrosion of the heating system and the formation of scaling and deposits, it is of the utmost importance to wash the system before installing the appliance, in accordance with standard UNI-CTI 8065, using appropriate products such as Sentinel X300 (new systems), X400 and X800 (old systems) or Fernox Cleaner F3.

Full instructions are provided with the product. However, for further details contact the manufacturer directly: SENTINEL PERFORMANCE SOLUTIONS LTD or FERNOX COOKSON ELECTRONICS.

After washing the system, you are advised to use inhibitors such as Sentinel X100 or Fernox Protector F1 to protect the system from corrosion and deposits.

It is important to check the concentration of the inhibitor after each modification to the system and each maintenance check, according to the specifications provided by the manufacturers (relevant tests are available from retailers).

The outlet from the safety valve must be connected to a collection funnel to channel any discharge if servicing is carried out. If the heating system is at a higher level than the boiler, you must install cut-off cocks on the system flow/return pipes. These cocks are provided in the optional kits.

Caution: failure to wash the heating system and to add a suitable inhibitor shall invalidate the appliance guarantee.

4.5. Filling the system

Before making the boiler connections, it is good practice to allow water to flow through the piping to eliminate any foreign bodies that could compromise the correct functioning of the appliance.
The appliance should be filled slowly to allow any air bubbles to be released through the appropriate vents within the heating system. In closed circuit heating systems, the cold filling pressure of the system must correspond to the expansion vessel pre-inflation pressure.

- In heating systems with an **open** vessel, the circulating liquid may come into contact with the air. During colder months when the heating system is in use, the end user must check the level of water circulating in the expansion vessel regularly. The water content of the recirculation system must remain constant. Practical experience shows that a regular check of the water level must be carried out every fortnight to keep the water content almost constant. If more water is required, perform the filling process, when the hot water boiler has cooled down to room temperature. These precautions are designed to prevent the occurrence of heat stress on the steel body of the boiler.
- The water used to fill the heating system must be purified and not contain any air.

Caution!
Do not mix the heating water with anti-freeze or anti-corrosion products in the wrong concentrations! This could damage the seals and cause noisy operation.
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Once all the hydraulic connections have been made, check the seals under pressure by filling the boiler.
This should be done carefully, in the following sequence:

- open the air relief valves on the radiators, boiler and system;
- gradually open the system filler cock, making sure any automatic air relief valves fitted on the system are working properly;
- close the air relief valves on the radiators as soon as water starts to trickle out;
- check on the system pressure gauge that the pressure reaches a value of approximately 1 bar (this only applies for systems with a closed vessel - consult any local regulations or standards that allow it); for systems featuring an open vessel, the reintegration is automatic through the vessel itself;
- close the system filler cock and then vent any air again through the radiator air relief valves;
- check the seal on all connections;
- after starting the boiler up for the first time and the system is at the right temperature, stop the pump operation and repeat the air venting operations;
- allow the system to cool down and, if necessary, return the water pressure to 1 bar (this only applies for systems with a closed vessel - consult any local regulations or standards that allow it); for systems featuring an open vessel, the reintegration is automatic through the vessel itself.

NOTE
In systems with a closed vessel, where permitted, the water pressure in the heating system - when the system is cold - should not drop below 1 bar; if it does, open the system filler cock. This should be done with the system cold.
The pressure gauge in the system allows you to read the pressure in the circuit.

4.6. Basic requirements for installing “Tecnika” hot water gasification boiler to allow simple maintenance and servicing:

- the boiler must be installed on a thermally safe, fireproof support 50 mm high;
- the minimum clearance in front of the boiler to allow it to be cleaned, serviced, etc. must be 1000 mm;
- the minimum clearance permitted between the rear of the boiler and a wall must be 400 mm;
- the minimum clearance between side of the boiler and a wall must be 500 mm in order to allow simple maintenance and servicing of the convective heat exchanger and the back of the appliance;
- the minimum clearance between upper side of the boiler and the ceiling must be 600 mm to guarantee easy access to the appliance control panel, for connecting the emergency coil and for heat exchanger cleaning and maintenance;
- the ceramic combustion gas ducting element must be positioned in the boiler combustion chamber.

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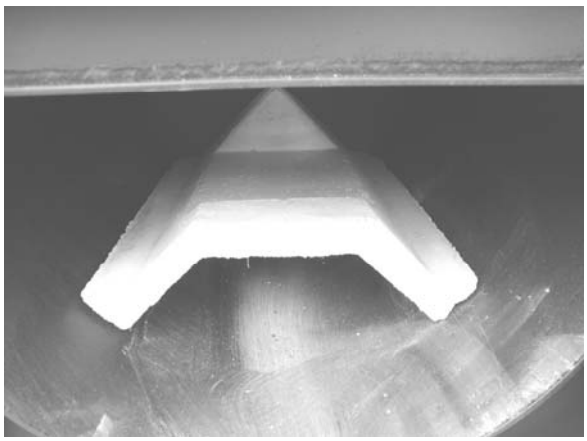

Fig.4.6.1 Ceramic combustion gas ducting element positioned in boiler combustion chamber.

CAUTION: the utmost care is needed when fitting and installing the ceramic element. Take all the preventive measures needed to avoid damaging the element. After having installed the element in the combustion chamber, push it back until it touches the vertical rear plate of the heat exchanger.

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o Fit the thermostatic valve for controlling the air flow.

Fig. 4.6.2 Thermostatic valve for controlling the combustion process air flow is installed and the stem is connected to the air fin (*by means of the chain*).

EXPLANATION: the chain length and inlet air fin opening must be adjusted with the boiler running and once the thermal opening parameters have been reached. The air fin must be open to allow the flow of air into the boiler in order to start the boiler:

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- fit an automatically opening overtemperature valve which opens at high temperatures (not included in the supply of the boiler). The valve opens and sends water from the cock to the emergency cooling coil of the boiler thus decreasing the circulating water temperature. Check the valve instruction manual for more details.

EXPLANATION: the detecting section of the thermostatic valve must be screwed into an opening situated in the upper rear part of the heat exchanger (see photo). The water flow control module of this thermostat valve must be fitted on one of the ends of the emergency coil (either the inlet or outlet end). The water flow control module of this thermostat valve must be connected to the water from the cock at DHW network pressure. The emergency cooling coil must be connected to the exhaust system. Be careful: the water may be very hot.

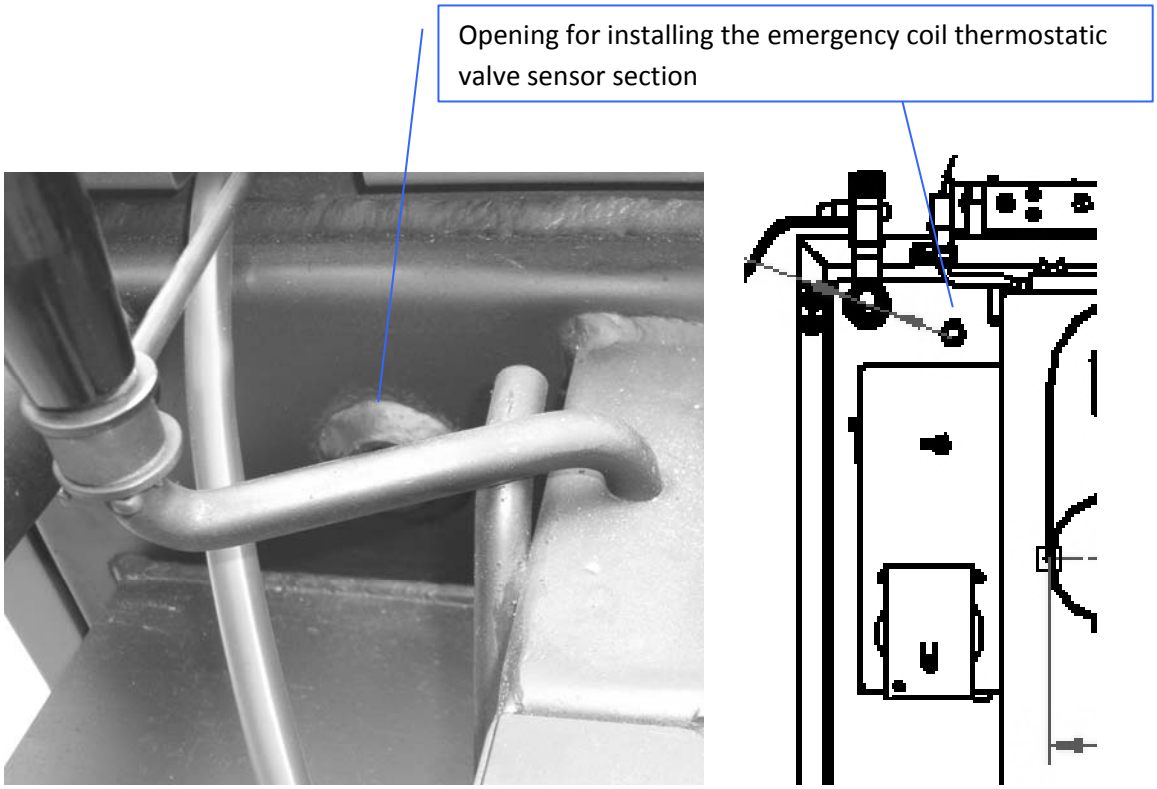

Fig. 4.6.3 View of the opening of the hot water boiler where to fasten the thermostatic valve sensor module for the emergency cooling coil to be connected to the water flow from the cock

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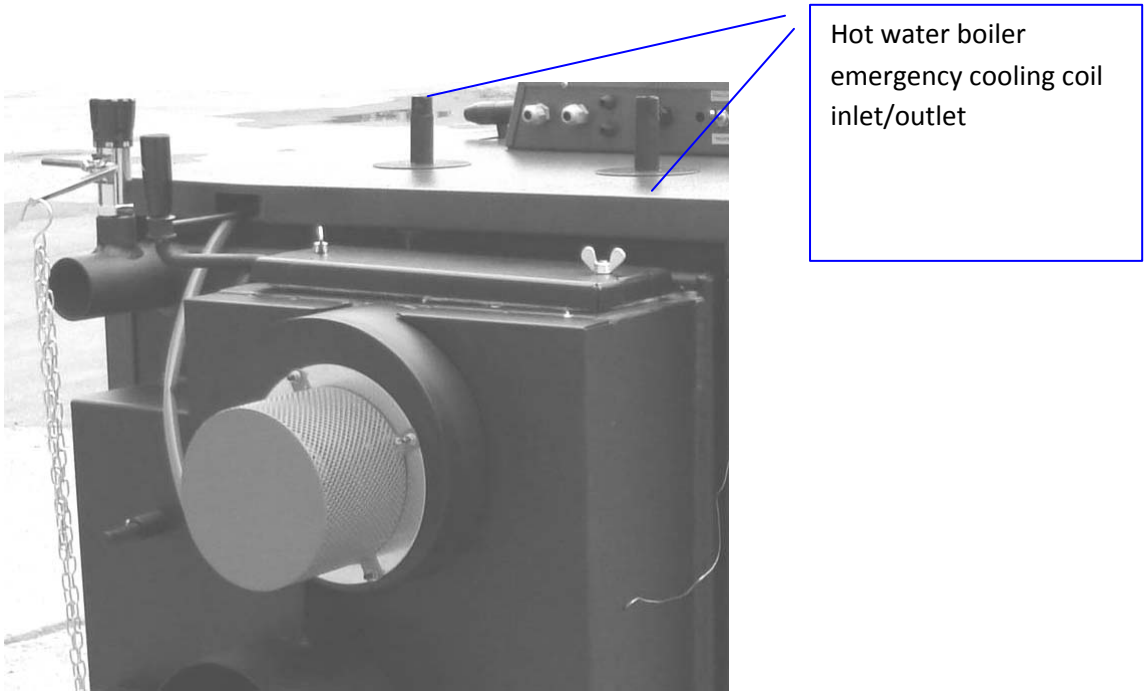

Fig. 4.6.4 View from back of boiler - with indication of ends of the emergency cooling coil

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- Connect the hot water boiler inlet and outlet to the heating system using suitable fittings, etc. according to the installation diagram.

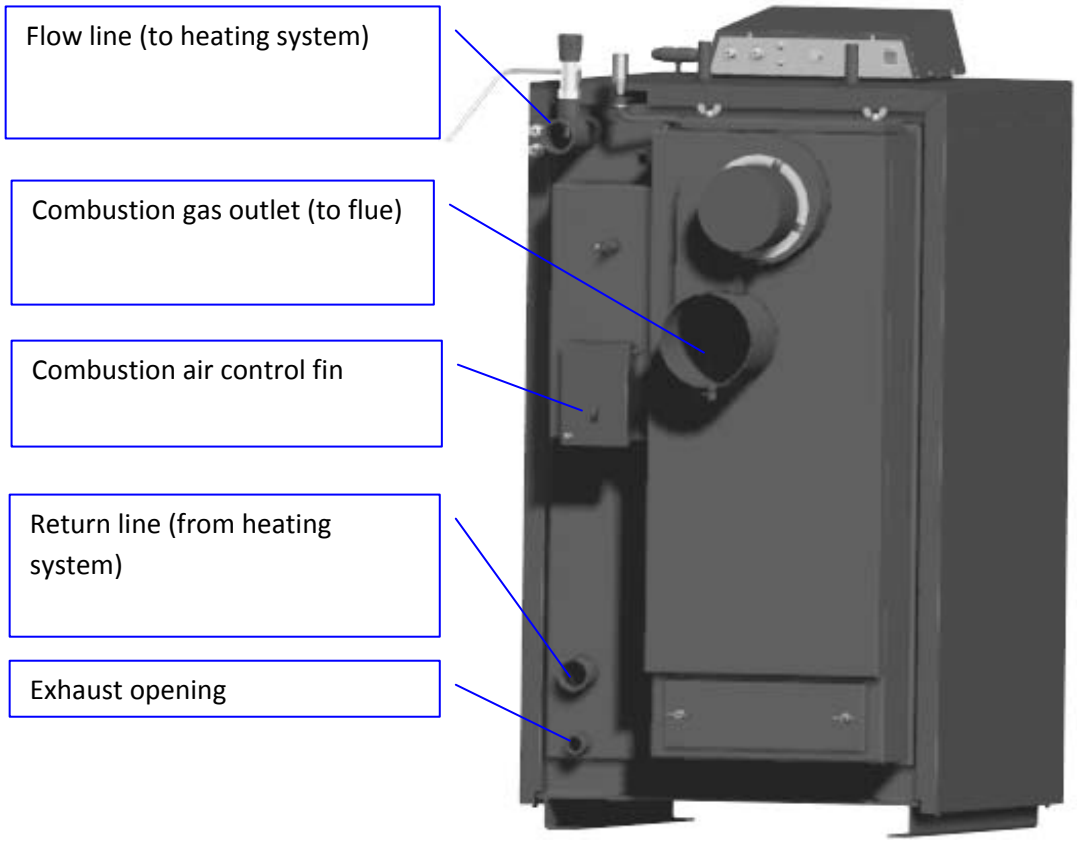
Flow line (to heating system)
Combustion gas outlet (to flue)
Combustion air control fin
Return line (from heating system)
Exhaust opening

Fig. 4.6.5 Rear view of "Tecnika" hot water boiler - *with indication of connection points*

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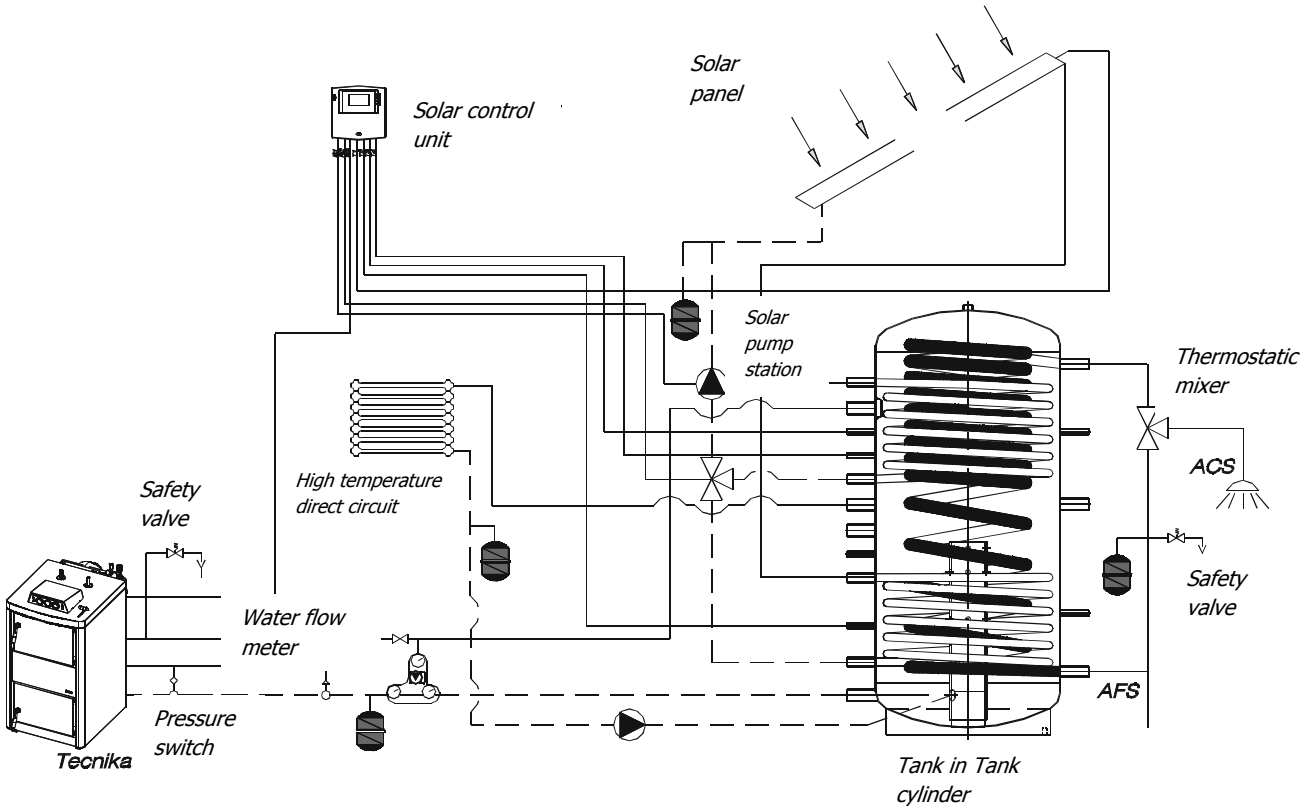

Fig. 4.6.6 General hydraulic circuit recommended for connecting the "Tecnika" hot water boiler to the heating system provided with three-way valve and heat accumulator

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5. OPERATION

5.1. "Tecnika" hot water wood gasification boiler interface control panel

The following control devices are arranged on the front part of the boiler interface control panel:

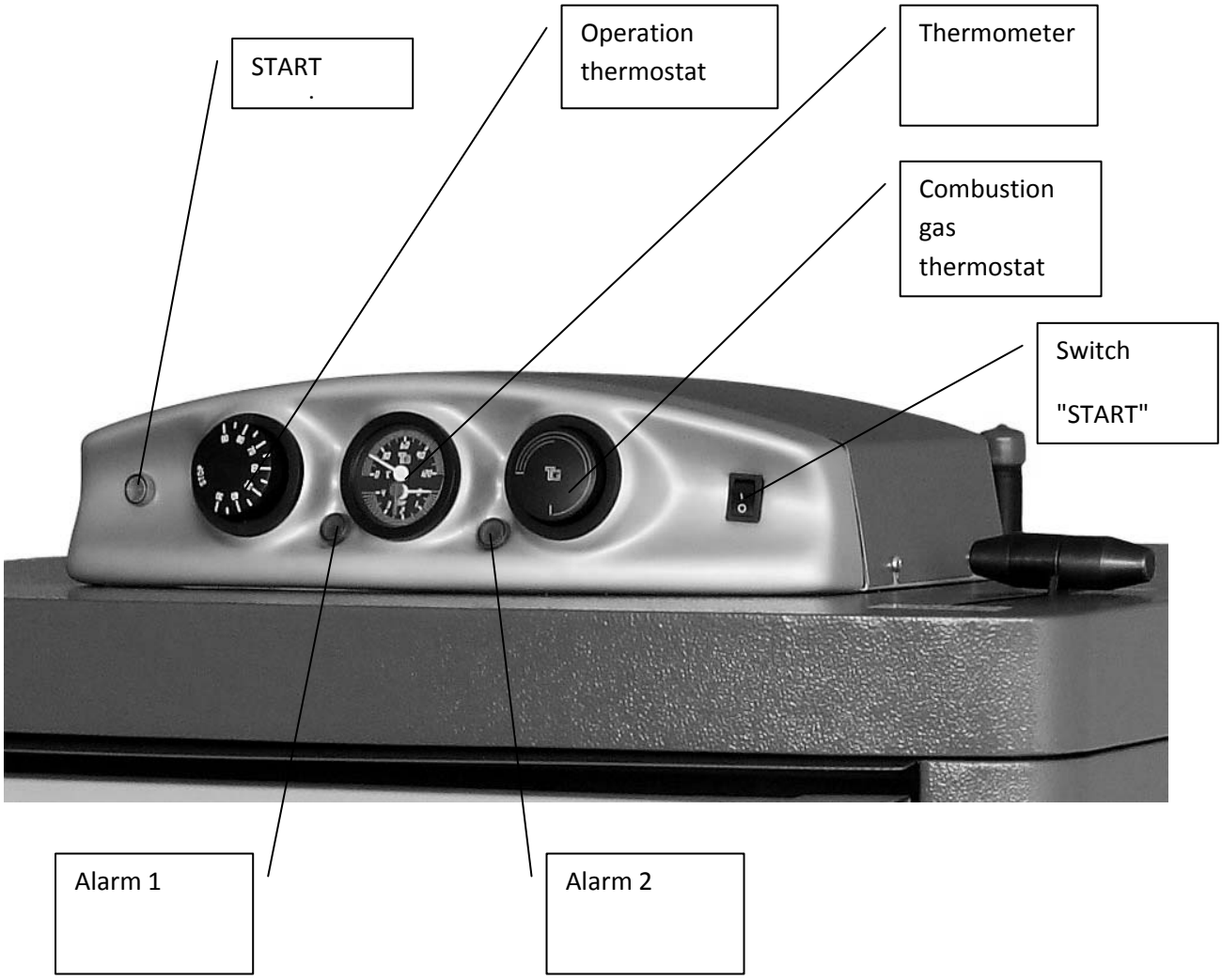

Figure 5.1.1 Interface control panel provided with "Tecnika" hot water boiler control and operation devices - *front view*

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- **Operation thermostat** - Assigns the set point of the water circulating the boiler. The combustion gas fan of the boiler will run until this set point is reached and supplies thermal energy to the heating system. The boiler will switch to stand-by mode.
- **Combustion gas thermostat** - Assigns the combustion gas temperature set point. The boiler combustion gas fan does not work at temperatures lower than the set point of this thermometer and combustion gases will not be extracted by the fan. Consequently, the remaining combustion residues will not be consumed if they remain in the fuel hopper of the boiler only.
- **Temperature pressure gauge** - This indicates the operating temperature of the water circulating in the heat exchanger sleeve of the boiler in addition to water overpressure.
- "**START**" switch - This sends the "START/STOP" signal to the boiler combustion gas fan which will run at nominal heat output (ON) or switch to stand-by mode (OFF).
- "**START**" warning light - This indicates the "START/STOP" state signal to the boiler combustion gas fan.
- **"Alarm 1" warning light - Overheat emergency** - This indicates an overheating emergency of the boiler caused by activation of the emergency thermostat. In case of activation, cool the appliance, check and repair the cause of the emergency situation. Finally, reset the emergency thermostat.
- **"Alarm 2" warning light** - (**optional)** - This indicates the heat exchanger state - If the combustion gas temperature is higher than given levels the warning light will come on and ashes must be cleaned.

The following control devices are arranged on the rear part of the boiler interface control panel:

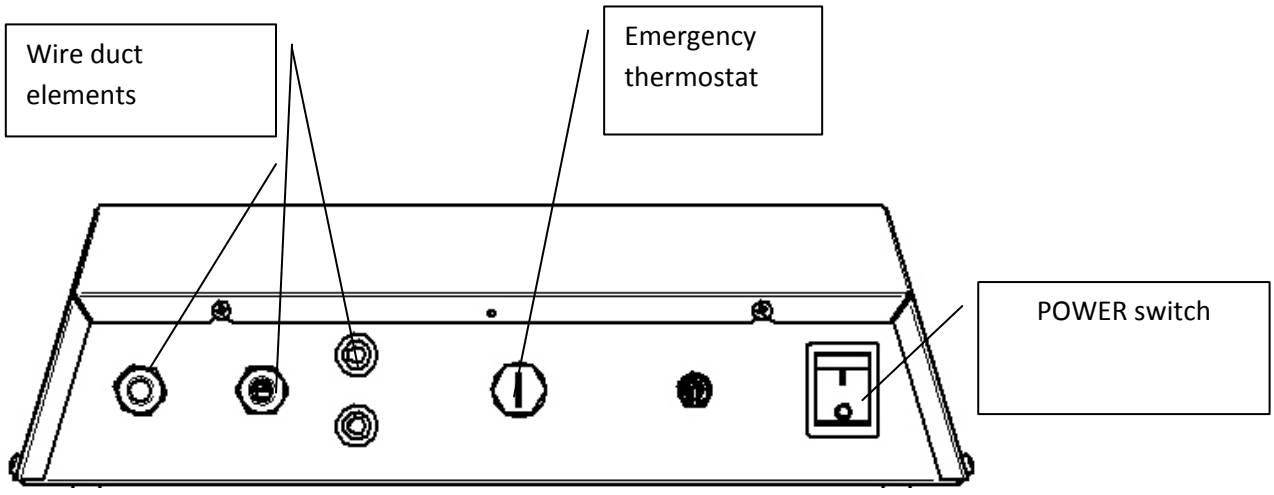

Figure 5.1.2 Interface control panel provided with "Tecnika" hot water boiler control and operation devices - *rear view*

- Main "**POWER**" switch - Turns main power supply of the boiler ON and OFF.
- **Emergency thermostat** - Protects the boiler from exceeding emergency temperature levels and overheating. This thermostat is calibrated at the factory to cut off the power supply of the appliance at a water temperature higher than 95°C.

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6. START-UP PROCEDURES

CAUTION: The boiler must be installed, adjusted and controlled ONLY by trained, authorised personnel.

6.1. Basic requirements

- It is strictly forbidden for the fuel to be kept near the boiler; the minimum safety clearance between the fuel and the appliance is 500 mm.
- It is advisable for the fuel to be kept in a room close to the one where the boiler is installed.
- The fire prevention regulations must be taken into consideration during the appliance installation procedure and during the fuel storage. It is also recommended that a fire extinguisher be fitted in a safe and easily accessible place.
- All maintenance procedures must be carried out as shown in this manual.
- The "Tecnika" hot water boiler must be loaded with fuel by personnel who have read this entire instruction manual. ***CAUTION:*** *presence of children in the operating area of the boiler is not allowed.*
- The boiler must be regularly inspected by maintenance personnel or other trained personnel.
- The end user must not carry out interventions or repairs etc. on the appliance. In case of faults or warning messages, refer to the troubleshooting table (at the end of this manual) and contact the service centre if the situation is not described in the table.
- Setting or increasing the heat output to values higher than the nominal heat output of the boiler is not allowed.
- Ash deposited in the combustion chamber of the boiler must be collected in fireproof containers and cooled at ambient temperature. Cooled ash can be disposed of in specific rubbish containers.
- At the end of the each heating season, the boiler, flue duct and other modules of the system must be cleaned completely to remove deposited ash, tar, etc.

Fuel is fed manually into "Tecnika" series hot water wood gasification boilers. The heat output of the boiler essentially depends on fuel properties and mainly on the humidity content, but also on the operating mode of the boiler. Practical experience has proven that efficient pyrolysis process in hot water boilers of this type is reached with circulating water temperatures higher than 60°C.

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6.2. Electrical connections

General warnings

Electrical safety is only ensured if the system is correctly connected to an efficient earthing system, built in accordance with the provisions of the applicable safety standards.

Remember that an easily-accessed bipolar switch with a minimum contact opening of 3 mm must be installed on the electrical power supply line to the boiler, in order to facilitate and speed up any maintenance operations.

The power supply cable must only be replaced by authorised technical personnel. Failure to observe the above recommendations may compromise the safety of the appliance.

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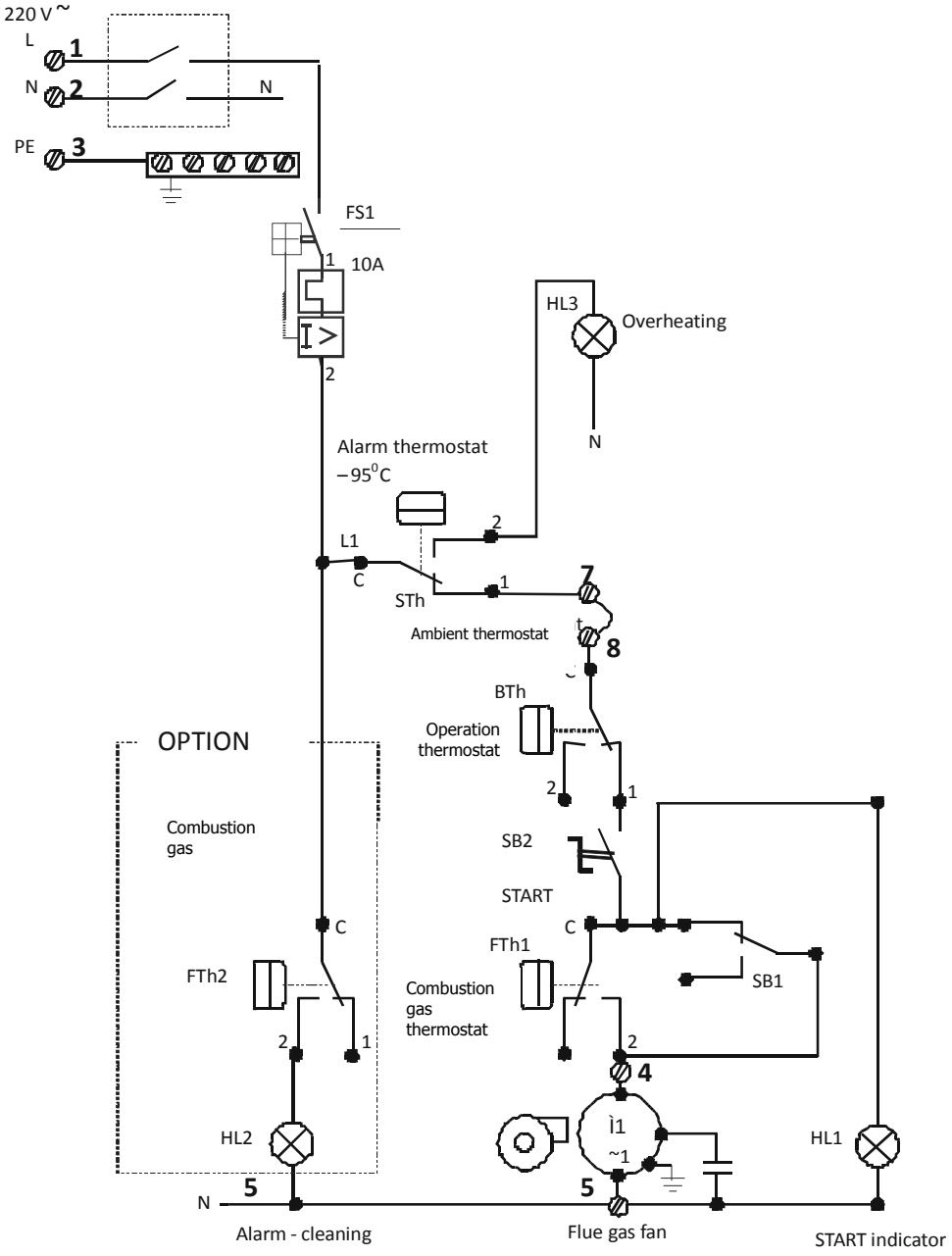
6.3.1 Wiring diagram

The wiring diagram of the "Tecnika" hot water wood gasification boiler is shown in **Figure 6.2.1**



Preliminary checks
The first start-up must be performed by professionally qualified personnel. RED will not be held liable for any damage to persons, animals or property caused by failure to observe the above instructions.

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6.3. Boiler start-up preparation procedure

The "Tecnika" hot water boiler is turned on by setting the POWER switch to the ON position.

Check operation of the various elements/modules of the boiler crucial for reliability, efficiency and operation of the heating system before manually igniting the fuel in the upper chamber:

- combustion gas fan
- start-up fin
- position and state of ceramic element in the boiler combustion chamber
- thermostat valve controlling air flow and distribution
- function of control and measuring elements (thermostats, thermometer-pressure gauge)
- flap seal bead.

Load a small amount of starter particles in the fuel hopper chamber (e.g. dry sticks, branches, etc.). Arrange the particles to form a heap located over the nozzle of the burner arranged in the lower section of the combustion chamber of the boiler. It is advisable to use no more than 5 kg of starter materials to start a stable combustion process. The opening of the burner must never be obstructed by particles to prevent volatile gases from passing through the nozzle and entering into the combustion chamber.

6.4. Igniting the fuel and heating the boiler

- The boiler operating thermostat must be set to a temperature higher than 60°C.
- Turn the combustion gas thermostat set point to minimum.
- Turn the combustion gas fan off (set START switch to the OFF position).
- Open the start-up fin - the start-up fin control lever is positioned on the right of the boiler upper section, simply by pulling it.

Figure 6.4.1 The start-up fin lever of the boiler is pushed back and the fin is **closed**.

- Open the fuel hopper door of the boiler, arrange the starter material forming a small heap over the burner opening so that the combustion gases can easily pass through the burner nozzle. Make sure that the heap does not obstruct the opening of the nozzle and allows the easy passage of combustion gases and fresh air. Start initial combustion, preferably using newspaper. Make sure that this material does not release toxic or harmful gases.

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CAUTION - Use of flammable liquids is not allowed. The figure shows how to arrange starter material in the fuel hopper chamber of the boiler.

Figure 6.4.2 Arrangement of starter material needed to start the boiler combustion process.

- After initial combustion, close the door to prevent combustion gases from being released from the chamber. Combustion gases produced by the combustion process pass through the open start-up fin and are aspirated by the chimney.

NOTE:

- Starting speed may vary according to local conditions (chimney and atmospheric conditions). This process must be observed close to acquire the practical experience needed to start the fire.
- After starting the fire, turn the combustion gas fan on (turn the START switch to the ON position), close the fuel hopper door and close the start-up fin by pushing the lever backwards. This will make the combustion gas change direction and flow through the burner nozzle, the combustion chamber and the convective ducting section of the boiler instead of being conveyed directly to the chimney.
- Turn the combustion gas thermostat to set the operating position. The position must be determined on a trial and error basis (you are advised to mark the position for the sake of convenience) by observing the start-up process in the boiler.
- Adjust the thermostatic valve for controlling the air flow. After start-up, the fin must be open to ensure available air for the combustion process. After turning on the boiler and reaching operating parameters, set the thermostatic valve as needed (*see description below*).

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NOTE:

- A large amount of steam may condense on the inner surfaces of the boiler causing leakage of water from the boiler combustion chamber door and from the combustion gas duct fin positioned on the rear lower part of the boiler when the boiler is started for the first time. This event does not influence operation and function of the boiler.
- It is not recommended to open the boiler loading chamber door unless the combustion gas fan is running and the start-up fin is closed, because volatile gases could be released from the chamber and introduced into the surrounding atmosphere thus contaminating the boiler room.

6.5. Adjusting the air flow control thermal valve

The thermostatic valve which controls the air flow is needed for an efficient combustion process which must be adjusted so as to allow optimal operation of the boiler.

EXPLANATIONS: the fin actuated by the thermostatic valve must be open to guarantee a sufficient flow of air for the start-up process until the nominal heat output is reached.

The thermostatic valve controls the air flow needed to obtain an efficient combustion process. This valve closes the air control fin if the temperature of the circulating water has reached high levels consequently preventing the boiler from overheating. This valve detects the temperature of the circulating water and actuates the lever which controls the position of the air control fin - At low circulating water temperatures, the lever opens the air control fin and conversely at high circulating water temperatures the valve closes the air control find and consequently reduces the air flow for the combustion process, thus reducing the heat output of the boiler. This thermostatic valve operates without any power supply source. The position of the air control fin must be observed and manually adjusted by using the applied chain.

CAUTION: the thermostatic valve must be regulated to **close** the air control fin when the circulating water temperature reaches 90°C.

Adjust the thermostatic valve as follows:

- The boiler is heated to reach a circulating water temperature of 80°C (measured by means of thermometer-pressure gauge).
- Adjust the position of the thermostatic valve knob - The notch of the thermostatic valve must correspond to the temperature of the water circulating in the boiler (operating temperature of 80 °C).
- Adjust the chain (which connects the lever of the thermostatic valve and the air control fin) thus modifying the position of the hook. The air control fin must be in the closed position. The chain must be taut.
- If needed, adjust the minimum position of the air control fin using the adjustment screw.
  EXPLANATION: the air control fin must not seal the air opening otherwise it will "suffocate" the combustion process and cause a large amount of tar to be deposited on the inner surfaces of the boiler. The fin must be opened to 3-8 mm according to local conditions (chimney draught, heat output of the boiler, fuel properties, etc.).

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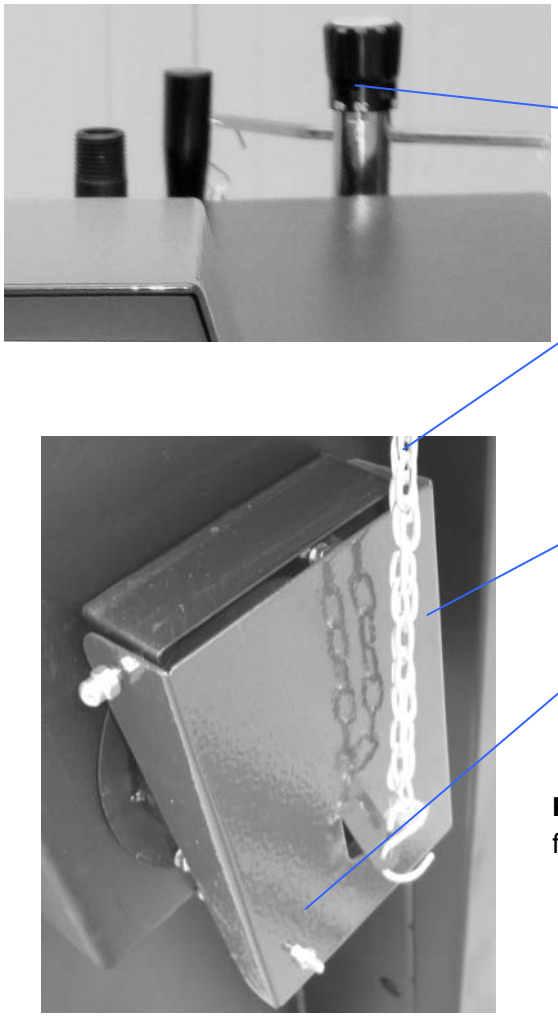
Air flow control thermostatic valve
Chain connecting thermostatic valve lever to air control fin
Air flow control fin
Minimum air flow screw

Figure 6.5.1 Air flow control thermostatic valve for the combustion process.

EXPLANATION: refer to the respective instruction manual for how to adjust the thermostatic valve.

6.6. Nominal operating mode of the boiler

After starting the boiler (i.e. after igniting the fuel, the additional fuel, after reaching high boiler temperature levels, with a stable combustion process and water circulating in the heating system) the system must be adjusted and only then can be considered working in constant manner.

If the heating system is provided with a recirculation pump, the operation of this pump must comply with the requirements above, i.e. must work with circulating water temperature higher than 65°C. If the boiler works at lower temperature levels, operation will cause a considerable deposit of tar and a decrease of heat transfer, in addition to chemical corrosion which decreases efficiency and reliability of the appliance.

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6.7. Fuel hopper loading

- Open the start-up fin (by pulling the start-up fin lever - see figure below): the combustion gases in the fuel hopper are released into the chimney by this fin.

Figure 6.7.1 Position the lever which controls the start-up fin position - The fin is **open** as shown in the figure above.

- Wait for 5-10 seconds, open the door of the fuel hopper chamber. The door must be opened in steps - ambient air initially penetrates into the chamber with door half open but does not allow combustion gases to be released from the chamber into the atmosphere.
- Open the door of the fuel hopper chamber and load the hopper with wood logs. It is advisable to keep wood logs handy to facilitate the fuel loading process.

  CAUTION: apply all the preventive measures to avoid burns and suffocation caused by combustion gases released from the combustion chamber by wearing protective clothing etc. The fuel must be loaded so as to be arranged in the chamber and optimise the volume available in the chamber for this purpose. Position the wood logs lengthwise. It is advisable to mix combustion residues when opening the burner before loading new fuel into the chamber to facilitate convection of volatile gases through the nozzle using the specific tool contained in the boiler maintenance kit.
- Close the fuel hopper door and the start-up fin (pushing the lever).

EXPLANATION: the loaded fuel must be heated. For this reason, the temperature of the circulating water decreases initially after this fuel is loaded. Practical experience shows that the heat output of the hot water wood gasification boiler starts increasing after approximately 30 minutes from loading the fuel hopper and rapidly reaches nominal heat output, and the nominal operating parameters as a consequence.

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Figure 6.7.2 View of the fuel hopper chamber and fuel state approximately 30 minutes after loading.

The figure above shows that the wood logs have already dried out and partial carbonation is apparent - wood logs appear darkened and a great deal of volatile gas (smoke) is being released. If a combustion process is visible, this is due to penetration of fresh air in the chamber from the open door (in nominal opening conditions there is no flame but only release of plenty of volatile gases in the chamber).

NOTE:

- Be careful not to block the door in order to close it easily when arranging wood logs.
- If different material is loaded into the fuel hopper chamber, the particles with a higher humidity content and/or larger particles must be arranged in the centre of the chamber, while partially dried or smaller particles must be arranged by the side of the chamber. This allows to avoid accumulation of fuel directly over the burner nozzle and consequently obstructing the nozzle itself, which would greatly decrease the heat output of the boiler.

EXPLANATIONS:

- The combustion gas fan is turned off when the circulating water set point is reached and the boiler switches to stand-by mode. In this mode, the fuel consumption rate decreases, as does the heat output of the boiler. Practical experience indicates that the typical heat output of a boiler in stand-by mode is approximately 10% of the nominal heat output of the boiler. In this mode, a small amount of air enters into the boiler and starts combustion residue oxidation to keep the boiler in so-called "ready for operation" mode.

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6.8. Adjusting boiler operating parameters

The combustion process must be adjusted at the nominal operating conditions for optimal, efficient fuel use. You are keenly recommended to adjust the combustion process by measuring combustion gases using a gas analyser. The adjustment must be carried out by a specialised technician.

The combustion process is adjusted by adjusting the air flow and distribution. The air consumed during the combustion process is aspirated into the fuel hopper chamber by the burner nozzle by means of the combustion gas fan. Air is distributed by the air box, where it is pre-heated and conveyed towards the fuel hopper chamber ("primary air") and towards the burner nozzle ("secondary air"). Air distribution is adjusted by the position of the primary air control fin (positioned over the air inlet). The primary air aspirated into the fuel hopper chamber is used to feed the wood gasification process (called "pyrolisis"). The secondary air is used to oxidise volatile gases which pass through the burner nozzle. These gases are mixed with pre-heated secondary air, mixed and oxidised in the combustion chamber of the boiler. This process allows effective fuel use with low running costs of the heating system. The process could be explained as gas combustion because most of the fuel is gasified and burnt in the oxidisation chamber of the boiler. The structure of the boiler allows optimal combustion process conditions and high heat efficiency in addition to simple heat output and boiler operating mode control. Adjusting the position of the primary air flow control fin requires knowledge of the boiler operating function, of the combustion process and of the fuel properties in addition to the services of a technician in order to obtain optimal results. Practical experience demonstrates that varying the position of the primary air control fin affects operating conditions of the boiler with a delay of approximately 15-30 minutes. Consequently, in this case wait for at least 15 minutes (preferably 30 minutes) to obtain constant operating mode of the boiler for the fin position to have a significant effect on the combustion process.

Air is appropriately distributed by the primary air control fin and by adjusting the fin itself, by means of the chain, hooked to the thermostatic valve lever. The following figures show details related to air control adjustment.

NOTE: an inspection opening is provided for checking the position of the primary air control fin.

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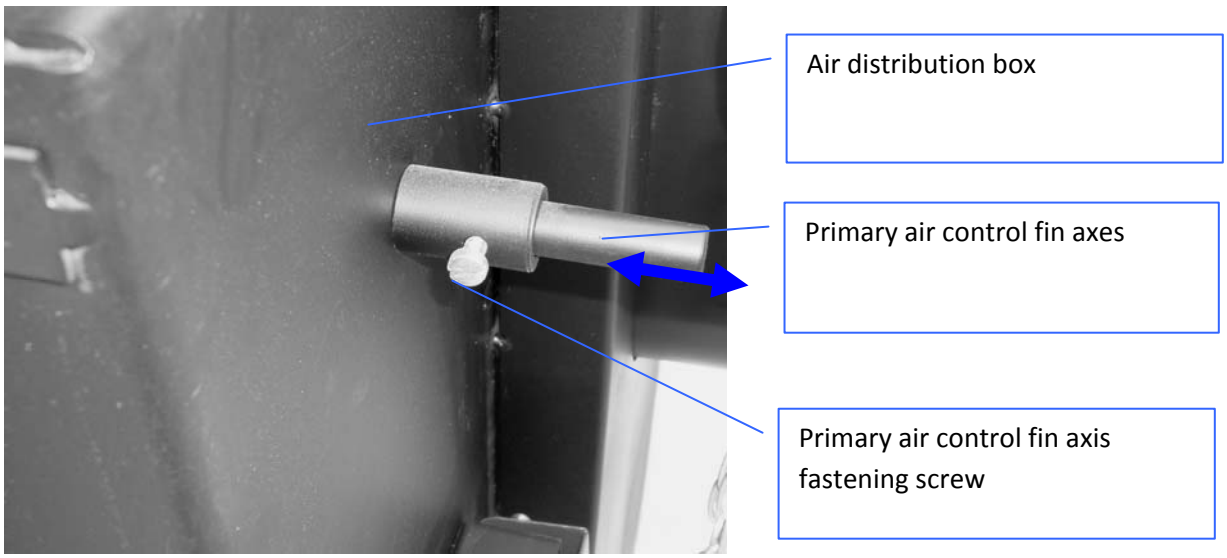

Figure 6.8.1 View of primary air control fin axis fastening screw

It must be possible to easily change the position of the fin by loosening the fastening screw, by manually pushing or pulling the fin axes (i.e. changing its position). You are keenly recommended to change the position of the fin by minor adjustments, approximately 1 or 2 mm at a time, and then fix the primary air control fin using the specific screw.

EXPLANATION: minor movements of the primary air control fin axes have considerable effects on the combustion process operating conditions and on the general performance of the boiler. For this reason, any change to the boiler air distribution setting must be followed by an adequate time before the expected result is obtained. Practical experience shows that using wood logs compliant with the requirements above the primary air control fin should be closed (pushed back and inwards). However, if the fuel contains more humidity than required, the primary air control fin should be open so as to assist fuel pyrolisis in the hopper chamber. In order to do this, adjust the position of the primary air control fin in small steps to obtain gasification of the raw fuel.

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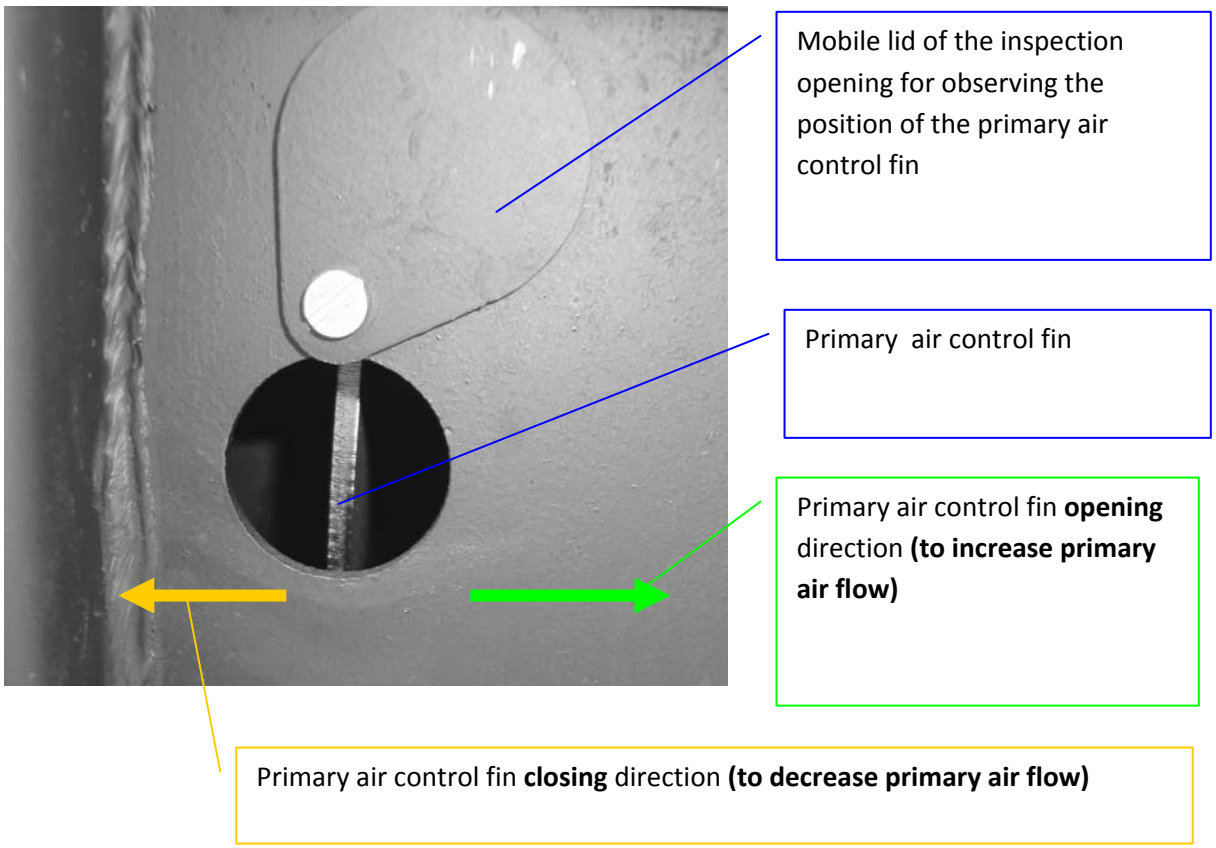
Mobile lid of the inspection opening for observing the position of the primary air control fin
Primary air control fin
Primary air control fin **opening** direction **(to increase primary air flow)**
Primary air control fin **closing** direction **(to decrease primary air flow)**

Figure 6.8.2 View of primary air control fin and air distribution box.

EXPLANATION: the mobile lid is provided to allow to visually inspect the primary air control fin. The lid must close the opening in nominal operating conditions.

- **Adjusting the combustion process**

  The operating parameters defining the hot water boiler heat output must be adjusted by authorised technicians to guarantee an efficient combustion process and optimal operation of the appliance. It is advisable to adjust the combustion process by means of measurements made with a combustion gas analyser.

  The flame released from the burner opening is sent downwards thus reaching the ceramic combustion gas ducting element positioned in the boiler combustion chamber. The flame colour in nominal operating conditions with an optimal combustion process (i.e. when the process occurs with low CO content in combustion gases and low excess air ratio) will be **bright yellow** with **blue** edges.

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Other flame features:

- a bright red flame indicates lack of secondary air and consequently the need to increase the secondary air flow by opening the total air flow control fin (operated by the thermostatic valve);
- **a light yellow or short flame** indicates excess of secondary air and the secondary air flow must be decreased by closing the total air control fin, adjusting the thermostatic valve which controls the fin;
- a dull flame ("weak flame") indicates that the primary air flow must be increased; pull the axes of the primary air control fin, thus opening the fin to do this;
- smoke in flame indicates that the secondary air is lacking but that the intensity of volatile gases and the release rate of tar have increased. For this reason, the primary air flow must be decreased and the secondary air flow must be increased; close the primary air control fin by pushing it to do this. The effect of this adjustment will be visible after at least 15 minute. Wait patiently. The position of the axes must be changed in small steps because this adjustment is very sensitive.

Optimal combustion can be obtained also by observing the conditions of the ceramic element positioned in the boiler combustion chamber; the outer surface of the ash layer must be light grey, the amount of deposited ashes must be low and there must be no black, unburnt particles (combustion residues are dark specks).

The combustion process adjustment amount can be determined by monitoring the colour of the combustion gases released from the chimney connected to the boiler. Dark combustion gases mean that the secondary air is not sufficient and/or that the amount of fuel is not compliant (the content of humidity is higher than required).

6.9. Boiler operation in stand-by mode

If the heat output of the boiler is higher than needed, the temperature of the circulating water will be increased and the set point of the boiler operating thermostat will be reached; in this case, the combustion gas fan will be turned off, the boiler will switch to stand-by mode and the heat output of the boiler will be further decreased. Air is naturally conveyed into the boiler in stand-by mode and oxidation of the combustion residues in the fuel hopper chamber is guaranteed. Measurements indicate that in stand-by mode, the heat output of the boiler is approximately 10% of the nominal heat output of the appliance. If the temperature of the circulating water decreases, the combustion gas fan comes on and within a 3-5 minute period the combustion process reaches nominal operating conditions and the boiler heat output is increased.

6.10. Boiler shutdown

The system is automatically shut down by not loading wood logs into the boiler combustion chamber, waiting for the combustion process to end and then turning the "START" switch to the OFF position. Wait for the boiler to cool down to ambient temperature and turn it off by means of the "POWER" main switch. You are recommended to carefully remove deposited ash from the heat exchange surfaces of the boiler.

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- **Emergency system stop**

  Emergency situations may occur during boiler use and the boiler will switch to alarm/fault mode. The boiler control panel indicates overheating and the boiler automatically switches to preventive mode to protect the system. The overheat protection thermostat (alarm thermostat) is activated and the "ALARM" warning light of the boiler indicates overheating. After having determined the reason for the alarm, take action to restore normal operating conditions of the boiler.

  CAUTION: the emergency thermostat is activated in case of emergency (boiler overheating). In this case, the boiler must be left to cool down and the cause of excessive temperature must be determined. Preventive measures must be adopted as a consequence. To manually reset the emergency thermostat, remove the protective cap and press the stem until the thermostat is reset (it will click). Then screw the cap back. After having checked the boiler and determined and eliminated the cause of overheating, turn the "POWER" switch to ON to operate the boiler in normal working mode. CAUTION - The procedure for checking the boiler and the heating system to determine the cause of overheating must be carried out by an authorised, specialised technician. After restarting, the entire system and the boiler must be heated up at moderate speed to detect incorrect situations and prevent switching to alarm mode.

CAUTION*:* forcing the fuel combustion process in the hopper chamber to stop (by pouring water and/or other extinguishing substances) is not allowed because this would cause damage beyond repair to the heat exchanger and the burner nozzle. You are keenly recommended to let the heat exchanger cool down slowly to ambient temperature and then inspect the boiler completely, checking the system modules - **this operation must be carried out by an authorised, specialised technician**.

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7. TROUBLESHOOTING

The following paragraph was written to provide a handy, quick guide to our customers to understand problems which could occur when using the TECNIKA.

No.	Fault	Cause	Repair method
1.	Low temperatures in the heated rooms	Insufficient boiler heat output	Increase fuel loading frequency and/or increase amount of loaded fuel
			Adjust boiler heat output
			Check humidity content in wood logs and replace with drier fuel if needed
		Low set point temperature of the boiler operating thermostat	The set point of the boiler operating thermostat needs to be raised (up to 90 °C)
		Low temperature set point of the remote room thermostat (where connected)	The room thermostat set point needs to be raised
2.	High temperatures in the heated rooms	High set point temperature of the boiler operating thermostat	The set point of the boiler operating thermostat needs to be decreased (it is advisable to keep it over 65 °C)
		High temperature set point of the remote room thermostat (where connected)	The room thermostat set point needs to be decreased
		High heat output of boiler	Decrease fuel loading frequency and/or decrease amount of loaded fuel
3.	Emergency boiler overheating	No heat consumption or incorrect adjustment of the boiler parameters, or poor functioning of the heating system	Check correct operation of the heating system and adjust the operating parameters of the boiler and/or of the heating system control valves if needed. *These interventions must be carried out by an authorised technician*. When the boiler has cooled down to ambient temperature and the cause of the boiler overheating has been remedied, unscrew the protection cap from the emergency overheating thermostat and press the stem until the thermostat is reset, then screw the cap back on. Turn the "POWER" main switch on and off and then restart the boiler.

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4.	The flame appears to be "dull" and smoke is coming out of the chimney	Poor quality of wood logs (in most cases, humidity content is higher than 20%)	It is advisable to replace fuel and use wood logs with properties compliant with requirements
		Non optimal setting of operating parameters	Adjust the operating parameters of the boiler to obtain an efficient combustion process
5.	Presence of unburnt fuel in the combustion chamber	Fuel combustion process inefficient	Adjust air flow
6.	High combustion gas temperature (if a combustion gas thermometer is installed)	Ash deposited on boiler heat exchange surfaces forming a heat resistant layer, which decreases heat exchange intensity	Carefully clean boiler heat exchange surfaces
7.	Steam condenses on boiler heat exchange surfaces	Low temperature of the water inlet flow	Adjust the set point temperature, which controls the circulation pump of the heating system. It is advisable to set the thermostat to a minimum value of 65°C.
8.	Combustion gases are released into the boiler room after a certain period of operation	Insufficient chimney draught	Check and clean the chimney if needed. Heat the chimney to ensure efficient operation.
			Check the chimney parameters and if required make changes (height, cross section, insulation, etc.) - *this operation must be carried out by an expert.*
		Deposit of ash or obstructed chimney	Remove ash deposits from the chimney
		Ash deposits or obstruction of convective ducting of boiler	Clean the convective ducting of the boiler
		The door and/or lid seal is not working properly	The door seals must be replaced - *this operation must be carried out by an technician*
9.	Other faults not described above		You need to call for an authorised technician and have the boiler serviced if necessary

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8. CLEANING AND MAINTENANCE

Inspection and maintenance, carried out to the highest standard at regular intervals and using only genuine parts, are of primary importance for fault-free operation and long life cycle of the boiler.
Boiler maintenance is compulsory pursuant to the applicable Laws in force and it must be performed with the frequency set out in Italian Presidential Decree 412 of 26th August 1993 and subsequent amendments regarding the type of fuel used and the boiler output.

Failure to perform Inspections and Maintenance may cause material damage and personal injury.

For this reason, you are advised to take out an inspection and maintenance contract.
Inspection is necessary to determine the current condition of an appliance and to compare it with the nominal condition. This is carried out through measurements, checks and observations.

8.1. Instructions for inspection and maintenance

To ensure the long-term operation of your appliance and avoid altering the approved standard conditions of the product, only RED genuine spare parts must be used.

Clean ash deposits from the heat exchange surfaces of the boiler **regularly** to ensure efficient operation and high reliability of the appliance.

Ashes deposited on the surfaces of the combustion chamber of the boiler must be removed before the start-up process (before igniting the fuel) or, if the boiler was not stopped for several days, ashes must be removed every 2-3 days, according to heat output, fuel consumption rate and wood log properties (mainly ash content).

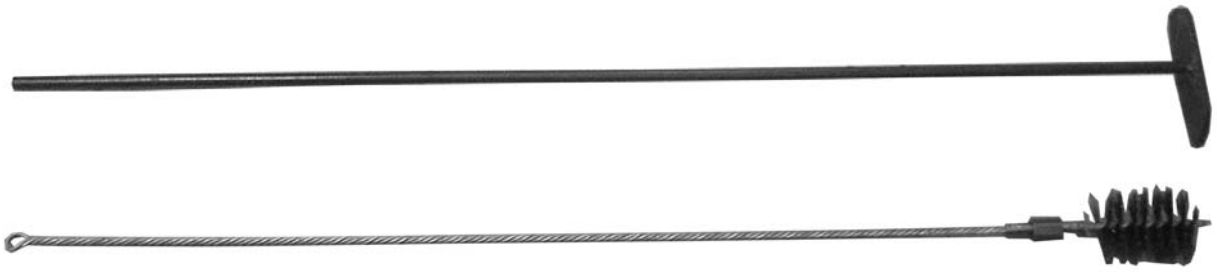

Figure 8.1.1 Tools (scraper and brush) for cleaning ashes from heat exchange surfaces of the boiler

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EXPLANATION:

- Regularly cleaning ashes deposited on the heat exchange surfaces of the boiler allows to obtain high reliability and operating efficiency of the boiler in addition to a long working life of the heat exchanger.

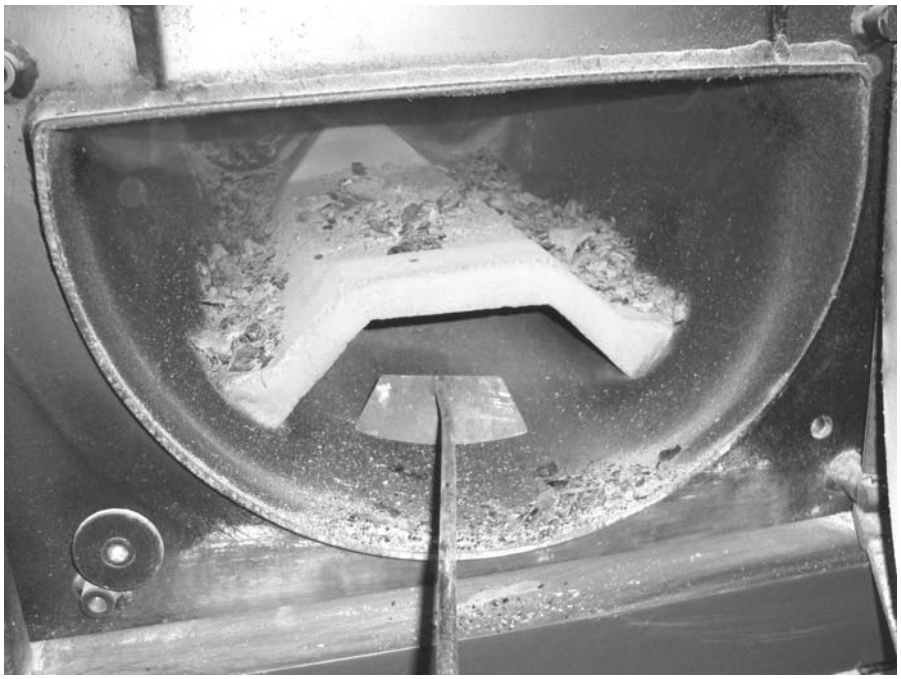

Figure 8.1.2 Cleaning ash residues deposited in the combustion chamber using a scraper for removing the layer of ash and combustion residue particles.

TIP - In order to minimise risks, it is advisable to position a metal shovel or adequate container for collecting ashes being careful not to scatter material into the environment. Collected ashes and combustion residues must be kept in a closed container with a lid (or in a suitable container) and left to cool down to ambient temperature. Consider safety requirements at all times.

The heat exchanger of the boiler must be cleaned at least once a month. Practical experience indicates that approximately 30-40% of the ash content of fuel is transported by the combustion gases towards the heat exchanger section of the boiler causing a considerable decrease of the heat transfer rate of the combustion gases to the circulating media, and thus a decrease of overall boiler efficiency. The ashes and combustion residue particles are also deposited on the combustion gas fan turbine. ***You are keenly recommended to regularly remove ash deposits from the convective section of the boiler and the chimney***.

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Clean the convective ducting of the boiler as follows:

loosen the special fastening nuts used for tightening the lid of the convective ducting of the boiler and carefully remove the lid. Practical experience shows that in some cases, the seal may not adhere to the convective section plates making it difficult to remove the lids. Be careful not to damage the seal bead and replace it if needed.

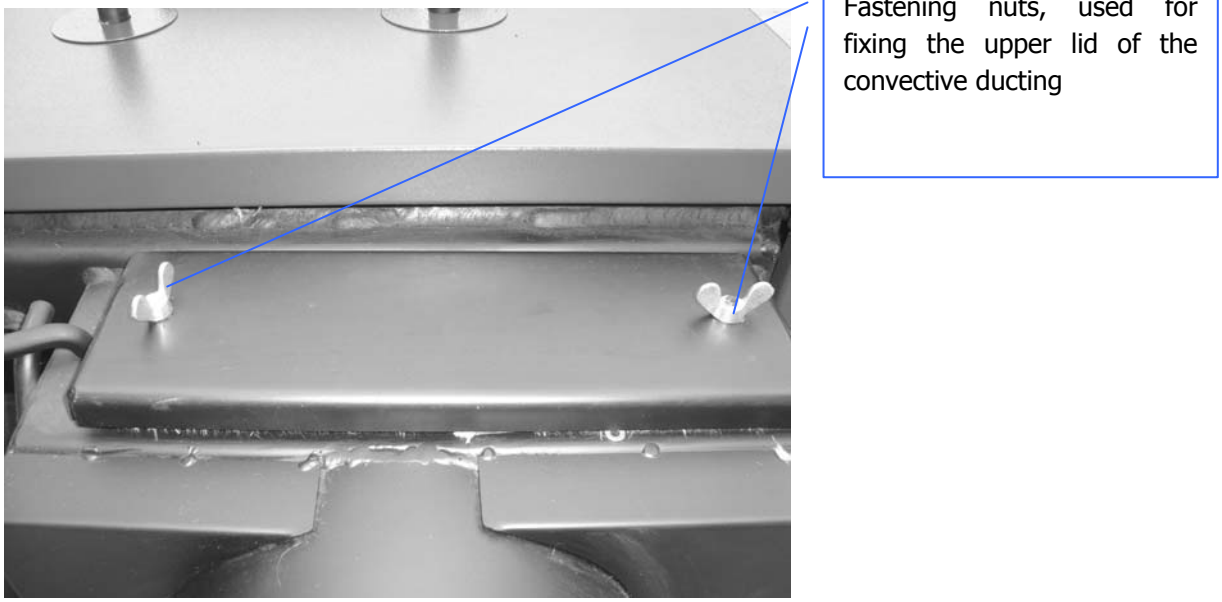

Figure 8.1.3 Upper opening convective lid for removing ash collected from heat exchange surfaces of the boiler

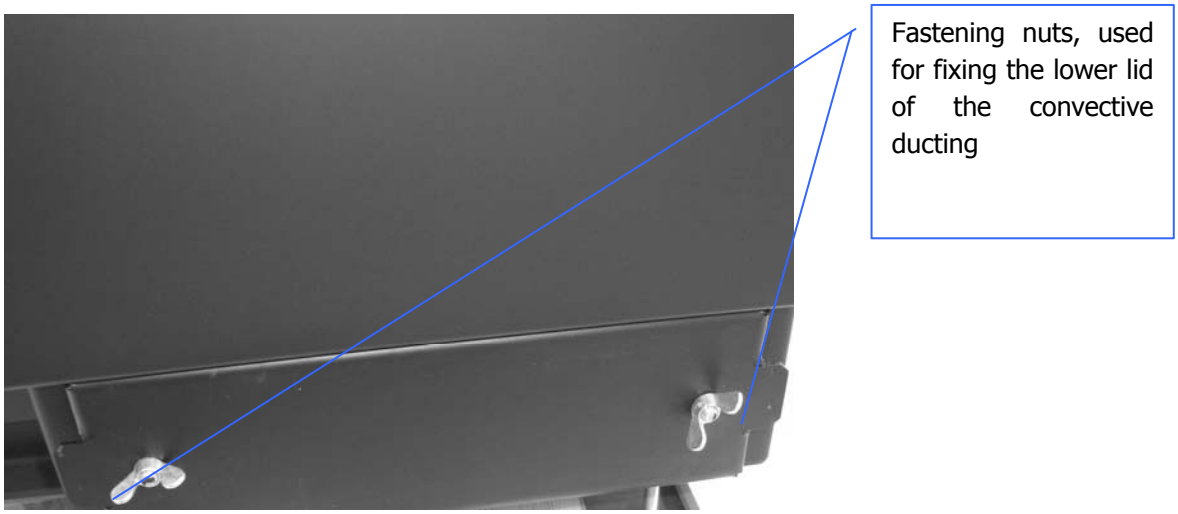

Figure 8.1.4 Lower opening convective lid for removing ash deposits after cleaning the heat exchange surfaces of the boiler

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The turbolators positioned in the convective section of the boiler can be observed after having loosened the fastening nuts and removing the upper lid.

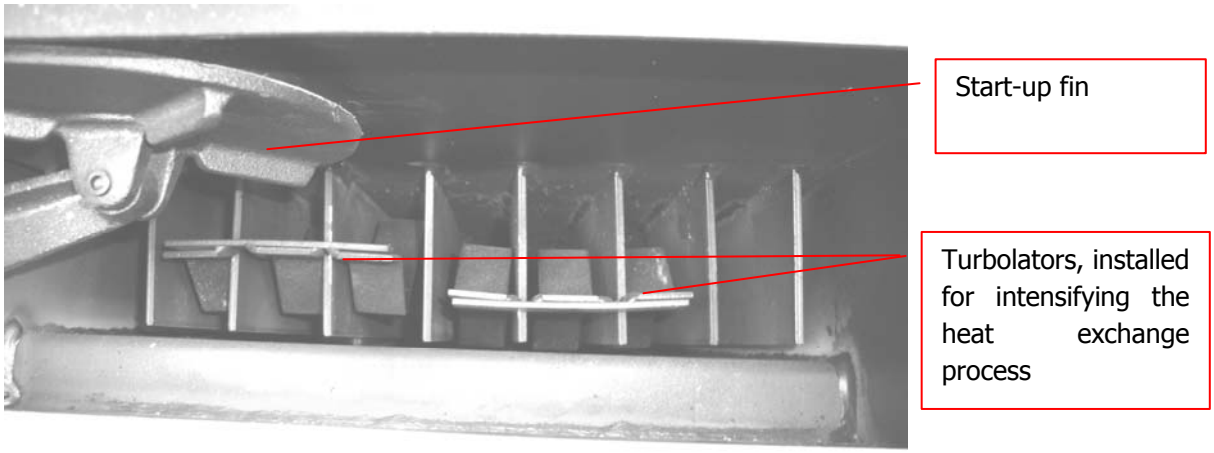

Figure 8.1.5 Turbolators installed in convective section of boiler

The ash cleaning procedure must be carried out with a special tool, in particular a metallic brush rubbed from the top down. After having brushed and removed ash, the collected ash residues must be removed by opening the lower lid to scrape ashes from the lower section of the boiler convective heat exchanger.

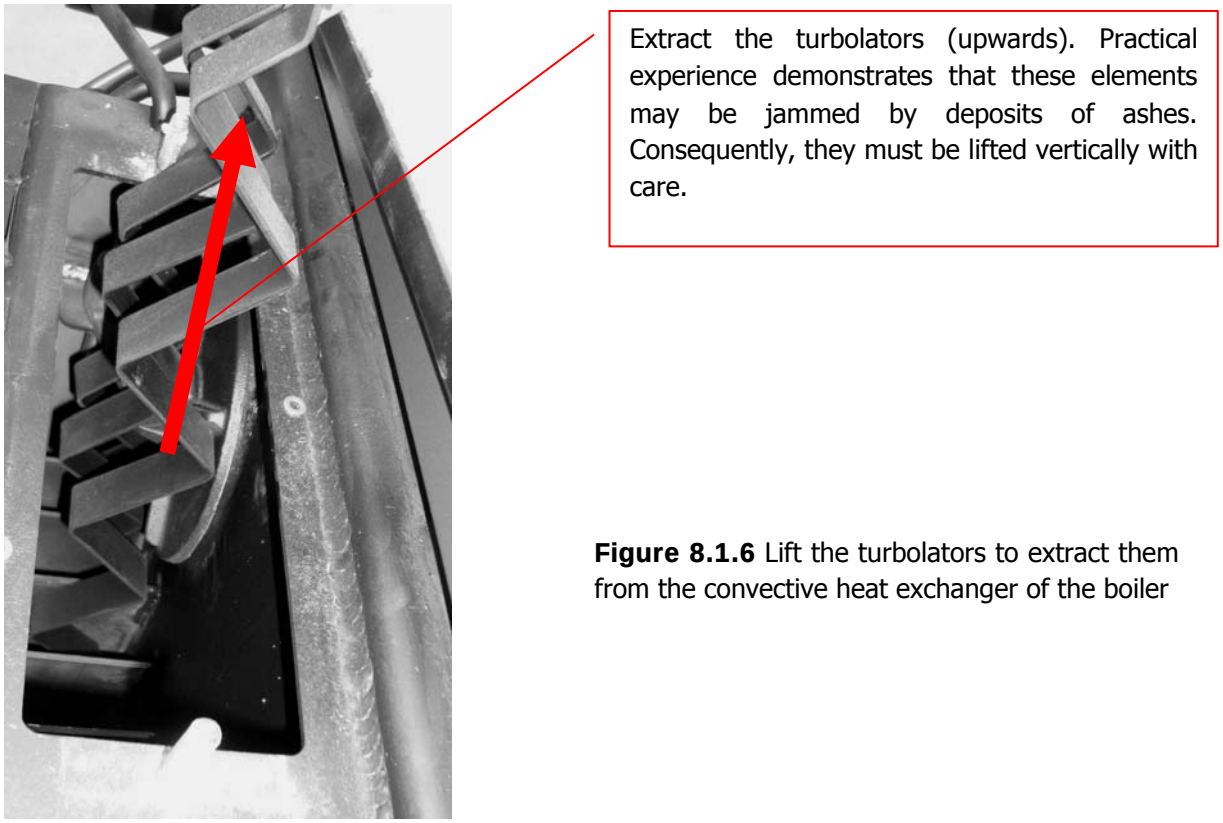
Extract the turbolators (upwards). Practical experience demonstrates that these elements may be jammed by deposits of ashes. Consequently, they must be lifted vertically with care.

Figure 8.1.6 Lift the turbolators to extract them from the convective heat exchanger of the boiler

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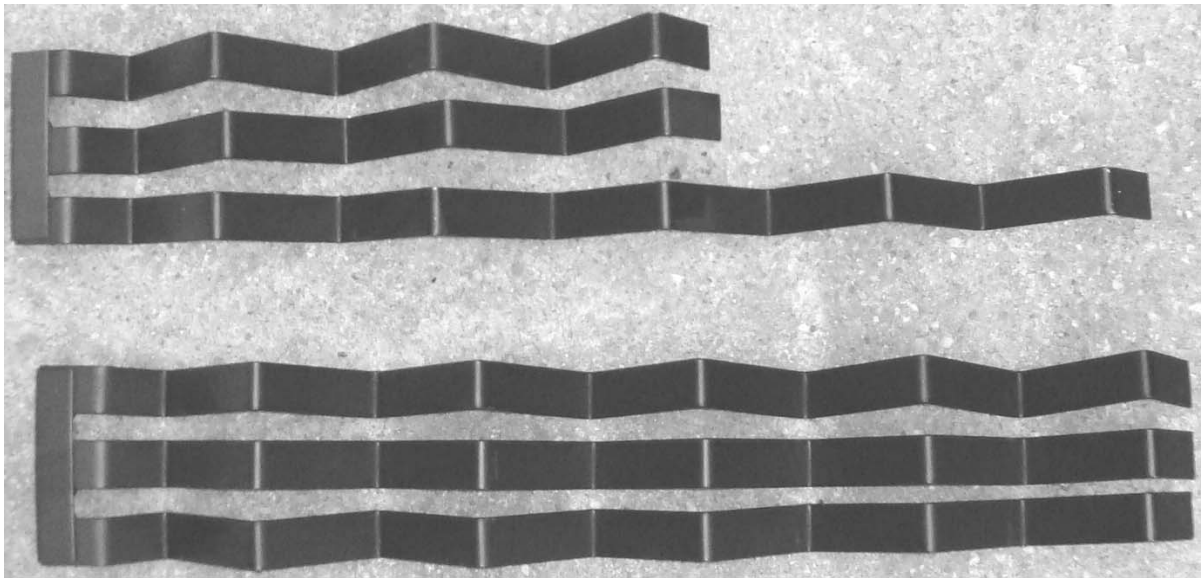

Figure 8.1.7 View of turbolators extracted from boiler.

EXPLANATION: the boiler turbolators are mutually different from one another. It is important to remember their position for putting them back correctly: one turbolator has shorter and curved elements. Consequently, in practice arranging the elements incorrectly is not possible due to the particular shape of the boiler.

Ash must be cleaned from the convective ducting of the boiler as shown in the figure below.

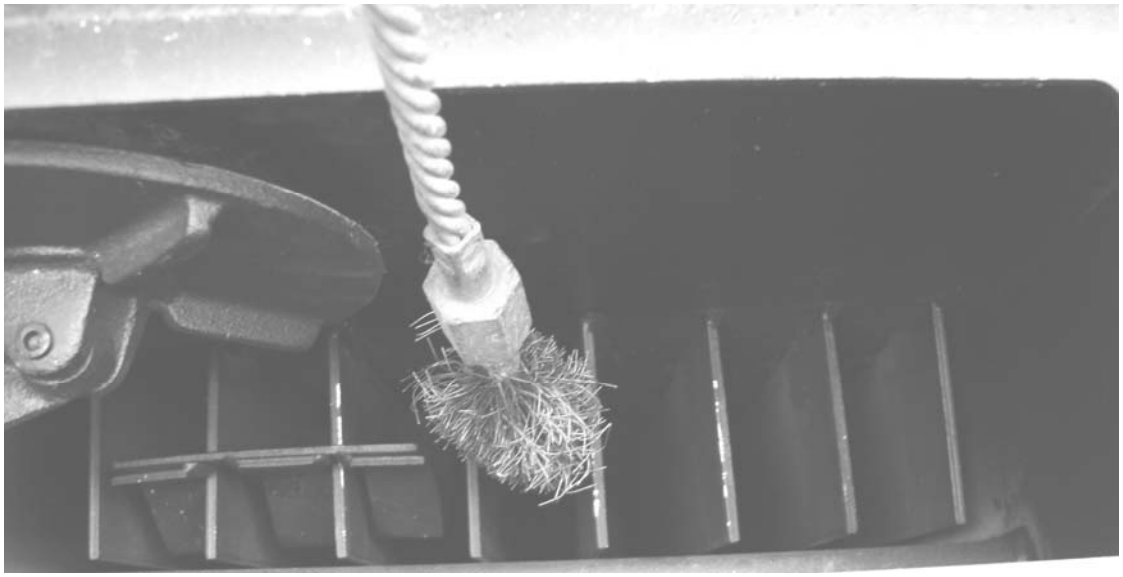

Figure 8.1.8 Remove ash deposits from the heat exchanger of the convective ducting of the boiler with a brush.

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After cleaning the convective ducting of the boiler from ash deposits, it is advisable to carefully clean the combustion gas fan turbine (or at least to check its conditions) of the boiler. CAUTION - Remove ash deposits and tar residues from the combustion gas fan turbine using a soft brush (do not use a metal brush or other rigid tool) passing through the combustion gas fan inlet opening.

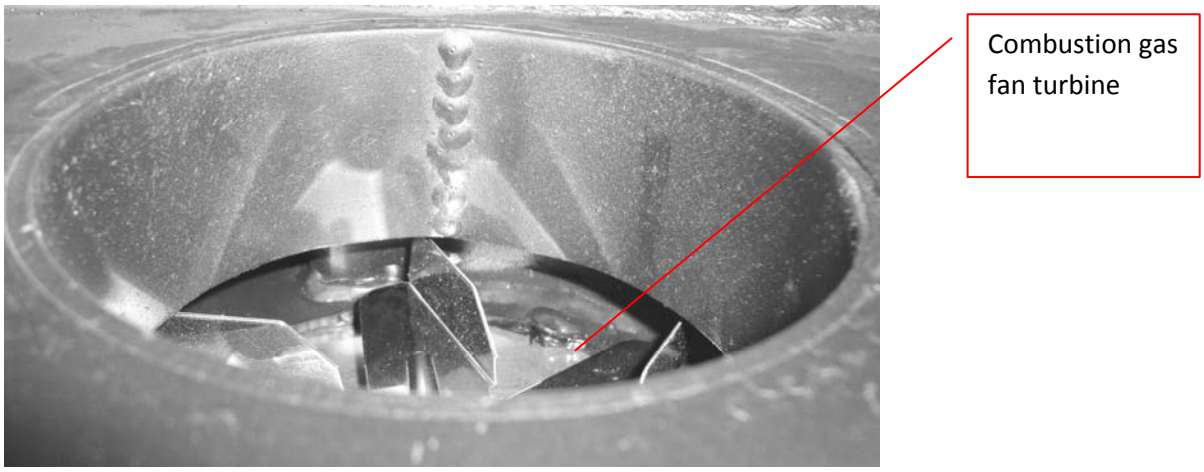

Figure 8.1.9 View of combustion gas fan inlet opening.

EXPLANATION: you are keenly recommended to remove the combustion gas fan and clean it well before putting it back onto the boiler, paying attention to seal and tightness. The boiler must be disconnected from the electric power by unplugging the boiler from the socket before removing combustion gas ashes **(compulsory procedure)**.

Open the lower opening of the convective ducting after having brushed and removed the ash residues from the thermal exchange surfaces. Ash particles are collected in this section of the boiler (see figure below).

Figure 8.1.10 View of the opening for removing ash from the lower part of the convective ducting of the boiler.

At the end of the ash cleaning procedure, the elements (turbolators, combustion gas conductive lids) must be refitted and tightened again.

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8.2. Training and end user demonstration of maintenance and adjustment procedures of the boiler

The maintenance procedures to operate the boiler efficiently and to maintain reliability at top levels must be illustrated and instructed to the end user. The installer must demonstrate and teach the end user to vary the operating parameters of the control panel of the boiler so as to actuate the appliance according to local thermal consumption:

The end user must be aware of what follows:

- instruction manual;
- boiler operation;
- heat output adjustment method and boiler operation method control;
- boiler maintenance procedure;
- boiler combustion chamber ash cleaning procedure;
- boiler convective ducting ash residue cleaning procedure;
- **procedure for loading wood logs in the fuel chamber** - logs must be arranged in the fuel hopper in the chamber to facilitate volatile combustion gas flow towards the burner nozzle of the boiler. The fundamental requirement is the use of wood logs with humidity content compliant to fuel requirements;
- **start-up procedure;**
- **ash cleaning procedure** - the end user must remove ash deposits from the surfaces of the combustion chamber and all other surfaces of the boiler;
- **procedure for cleaning ashes and other residues from the combustion gas fan turbine** - you are keenly recommended to clean ash regularly. Stop the boiler and clean the turbine in case of strange noise coming from the fan. Clean ash deposits, tar and other residues from the boiler turbine.

CAUTION: regular removal of any ash residue deposited on the heat exchange surfaces of the boiler ensures prolonged and reliable operation, as well as efficient and economical performance of the appliance.

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Via La Croce 8

33074 Vigonovo di Fontanafredda (PN) - ITALY

Telephone: +39 0434/599599 PBX

Fax: 0434/599598

e-mail: info.red@mcz.it

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